Central Radio Propagation Laboratory

IONOSPHERIC PREDICTIONS

for November 1965

IMPORTANT

NOTICE

SEE
INTRODUCTION PAGE

TB 11–499–32/TO 31–3–28

U.S. DEPARTMENT of COMMERCE

National Bureau of Standards

Number 32/Issued August 1965

Central Radio Propagation Laboratory

Ionospheric Predictions

for November 1965

[Formerly "Basic Radio Propagation Predictions," CRPL Series D.]

The CRPL Ionospheric Predictions are issued monthly as an aid in determining the best sky-wave frequencies over any transmission path, at any time of day, for average conditions for the month. Issued three months in advance, each issue provides tables of numerical coefficients that define the functions describing the predicted worldwide distribution of foF2 and M(3000)F2 and maps for each even hour of universal time of MUF(Zero)F2 and MUF(4000)F2.

NOTE: Department of Defense personnel see back cover.

National Bureau of Standards

The National Bureau of Standards serves as a principal focal point within the Federal Government for assuring maximum application of the physical and engineering sciences to the advancement of technology in industry and commerce. The Bureau is organized into four institutes as follows: The Institute for Basic Standards provides the central basis within the United States for a complete and consistent system of physical measurement; its responsibilities include administration of the National Standard Reference Data System. The Institute for Materials Research conducts a broad range of programs to provide a better understanding of the basic properties and behavior of materials and to make available reliable quantitative data on their performance; it distributes a wide variety of carefully characterized reference materials to science and industry. The Institute for Applied Technology develops criteria for the evaluation of the performance of technological products and services, provides specialized information services to meet the needs of industry, and studies problems of technological innovation. The fourth institute, the Central Radio Propagation Laboratory, is described below.

The Central Radio Propagation Laboratory

The Central Radio Propagation Laboratory is the central agency of the Federal Government for obtaining and disseminating information on the propagation of electromagnetic waves, on the electromagnetic properties of man's environment, on the nature of electromagnetic noise and interference, and on methods for the more efficient use of the electromagnetic spectrum for telecommunication purposes. In carrying out these responsibilities, the Central Radio Propagation Laboratory:

1. Acts as the primary agency of the Federal Government for the conduct of *basic and applied research* in these fields;

2. *Acts as the central repository* for data, reports, and information in these fields;

3. *Furnishes advisory and consultative services* in these fields to industry and to other government and non-government organizations;

4. *Performs scientific liaison* with other countries to advance knowledge in these fields, including that liaison required by international responsibilities and agreements;

5. *Prepares and issues predictions* of electromagnetic wave propagation conditions, and warnings of disturbances in those conditions.

INTRODUCTION

Tables 1 and 2, presenting predicted coefficients defining the numerical map functions for the worldwide variation of foF2 and M(3000)F2, provide the basic prediction or F2-layer propagation. With additional auxiliary information, these coefficients may be used as input data for electronic computer programs solving specific high-frequency propagation problems. The graphical maps, which are derived from the basic predictions, are provided for those unable to make use of an electronic computer. Instructions for use of these maps, figures 1 through 24, may be found in National Bureau of Standards Handbook 90, "Handbook for CRPL Ionospheric Predictions Based on Numerical Methods of Mapping," which also includes required additional data, nomographs and graphical aids, and may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington D.C., 20402, price 40 cents. The predicted sunspot number used for this month is shown in table A, which also lists previous observed and predicted Zurich smoothed relative sunspot numbers. Figure A shows the recent trend of solar activity, with both predicted and observed Zurich smoothed relative sunspot numbers.

The basic numerical mapping equations, their interpretation, and methods of using numerical maps are described in papers by W. B. Jones and R. M Gallet, "The Representation of Diurnal and Geographic Variations of Ionospheric Data by Numerical Mapping," vol. 66D, No. 4, July-Aug. 1962, pages 419-438, and "Methods for Applying Numerical Maps of Ionospheric Characteristics," vol. 66D, No. 6, Nov.-Dec. 1962, pages 649-662, both in the Journal of Research of the National Bureau of Standards, Section D. Radio Propagation. The predicted numerical map coefficients of tables 1 and 2 may be purchased in the form of a tested set of punched cards. Write to the Prediction Services Section, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado, 80301, to arrange for purchase of the punched cards, and for information and advice on the application of computer methods and numerical prediction maps to specific propagation problems.

Members of the U.S. Army, Navy, or Air Force desiring Handbook 90 and the monthly issues of Ionospheric Predictions should send requests to the proper service address; for Navy: The Director, Naval Communications, Department of the Navy, Washington, D.C., 20350; for Air Force: Directorate of Command Control and Communications, Headquarters, United States Air Force, Washington, D.C., 20330. ATTN: AFOCCAA. Army personnel should requisition these through normal publication channels, and should refer to Handbook 90 as TM 11–499 and to the monthly ionospheric predictions as TB 11–499–( ), with the serial number of the desired monthly predictions booklet inserted in the parenthesis. (For example, for Ionospheric Predictions Number 32, issued August 1965 and containing predictions for November 1965, the Army number would be TB 11–499–(32).)

Information on the physics of the ionosphere and the theory of radio wave propagation, including such problems as absorption, field intensity, etc., may be found in National Bureau of Standards Monograph 80, "Ionospheric Radio Propagation," by Kenneth Davies, which may be purchased from the Superintendent of Documents, U.S. Government Printing Office, Washington, D.C., 20402, price $2.75. Additional information on radio noise may be found in C.C.I.R. Report Number 322, "Revision of Atmospheric Noise Data," International Telecommunications Union, Geneva, 1964.

Reports to this Laboratory of experience with these predictions would be appreciated. Correspondence should be addressed to the Prediction Services Section, Central Radio Propagation Laboratory, National Bureau of Standards, Boulder, Colorado, 80301.

Table A

Observed and Predicted Zurich Smoothed Relative Sunspot Numbers

Month	Jan.	Feb.	Mar.	Apr.	May	June	July	Aug.	Sept.	Oct.	Nov.	Dec.
1954	6	6	4	3	4	4	5	7	8	8	10	12
	(14)	(12)	(11)	(10)	(10)	(9)	(8)	(8)	(8)	(10)	(10)	(11)
1955	14	16	20	23	29	35	40	46	55	64	73	81
	(12)	(14)	(14)	(13)	(16)	(18)	(22)	(27)	(30)	(31)	(35)	(42)
1956	89	98	109	119	127	137	146	150	151	156	160	164
	(48)	(53)	(60)	(68)	(77)	(89)	(95)	(105)	(119)	(135)	(147)	(150)
1957	170	172	174	181	186	188	191	194	197	200	201	200
	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)
1958	199	201	201	197	191	187	185	185	184	182	181	180
	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)	(150)
1959	179	177	174	169	165	161	156	151	146	141	137	132
	(150)	(150)	(150)	(150)	(146)	(143)	(141)	(142)	(141)	(139)	(137)	(137)
1960	129	125	122	120	117	114	109	102	98	93	88	84
	(136)	(135)	(133)	(130)	(125)	(120)	(118)	(115)	(110)	(108)	(105)	(100)
1961	80	75	69	64	60	56	53	52	52	51	50	49
	(100)	(90)	(90)	(90)	(85)	(85)	(80)	(75)	(70)	(70)	(65)	(60)
1962	45	42	40	39	39	38	37	35	33	31	30	30
	(60)	(50)	(48)	(45)	(42)	(37)	(34)	(31)	(29)	(28)	(27)	(34)
1963	29	30	30	29	29	28	28	27	27	26	24	21
	(31)	(28)	(26)	(25)	(25)	(25)	(23)	(21)	(20)	(18)	(18)	(17)
1964	20	18	15	13	11	10	10	10	10	10	10	
	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17)	(17.5)	(17.3)	(17.0)	(17.0)
1965	(15.0)	(16.0)	(16.0)	(16.0)	(15.0)	(17.0)	(21.0)	(28.9)	(22.0)	(22.0)	(26.0)*	
1966												

Note: Final numbers are listed through June 1964, the succeeding values being based on provisional data. The predicted numbers are in parentheses.
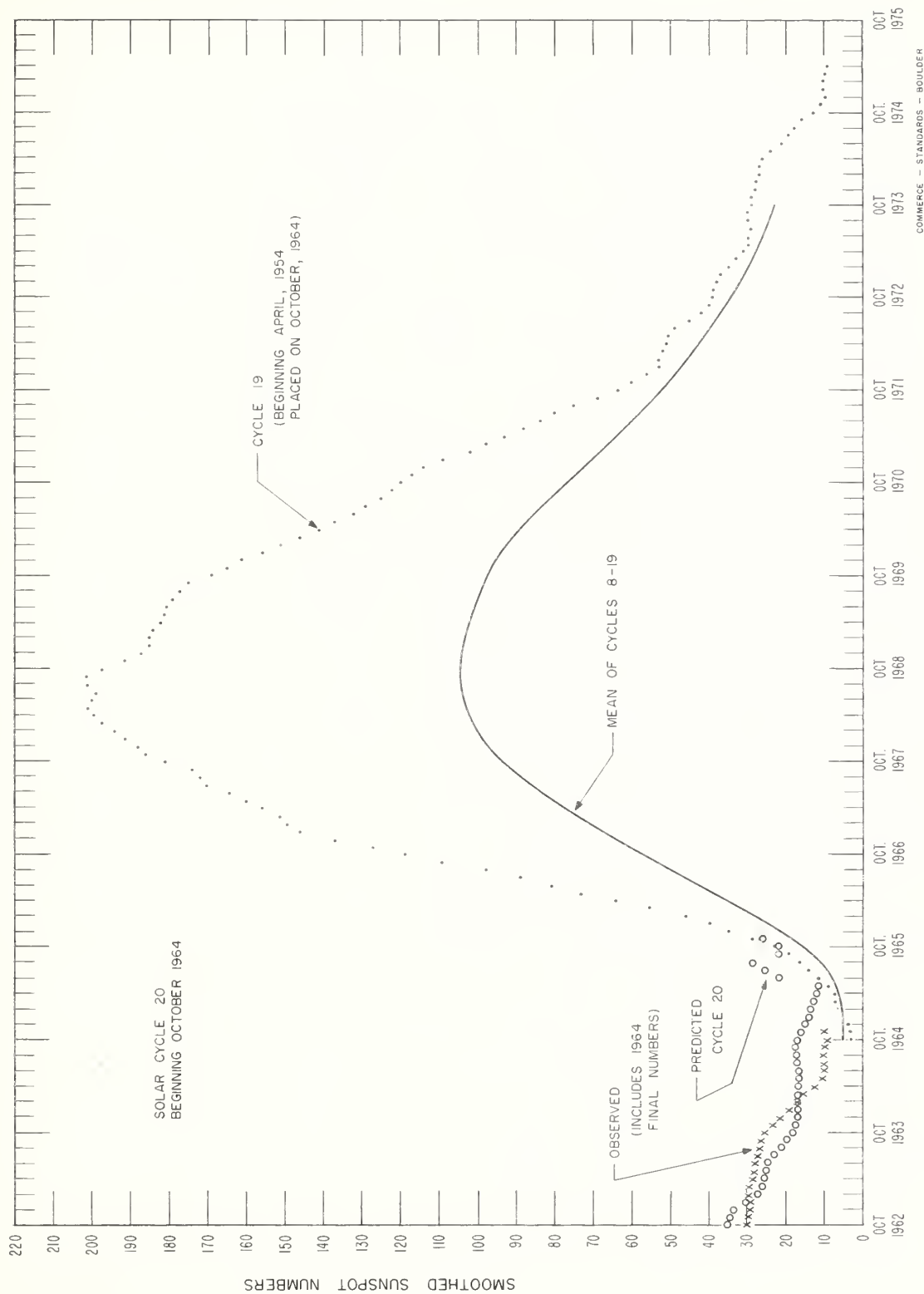
*   Number used for predictions in this issue.

FIG. A PREDICTED AND OBSERVED SUNSPOT NUMBERS

TABLE I

TIME VARIATION

GEOGRAPHICAL VARIATION

Harmonic		0	1	2	3	4	5	6	7	8
	k \ s	0	1	2	3	4	5	6	7	8
I	0	7.8827410+000	2.1799428+000	1.8142954+000	-6.9546165-001	2.9156496-001	-1.3983784-001	5.8344874-001	2.2493894-001	-1.8786153-001
	1	-3.0574378+000	-1.1752102+000	8.6534745+000	-1.1149538+000	-8.8556125-001	1.6010390+000	-1.1322325+000	4.2544926-001	-1.9807053-001
	2	4.0077837+000	4.1605140-001	1.1548251+001	4.7809702+000	7.4240421+000	1.2105305+000	1.1322325+000	-6.4307192-001	2.3499786+000
	3	2.2108613+001	2.2372816+001	2.2007050+001	1.3951927+001	-5.8200826+001	-1.1490766+000	1.1490766+000	-3.9970222+000	-7.2287619+000
	4	-1.0507965-002	-5.5631883+001	-6.0088320+001	-4.4589641+001	-5.8200826+001	1.9625465-001	1.2105305+000	9.4388100+000	-2.2159891+001
	5	3.0488151-001	-1.1306021+000	-1.1388509+002	5.6704776-001	-9.3906857+001	1.8358758+001	-1.1834109+000	1.4148710+001	4.2122208+001
	6	2.1098181-002	2.9210899+002	3.1832096+002	1.0403882-002	1.9203007-002	-7.4847280+001	7.7834109+001	-2.3394699+001	8.5249642+001
	7	2.1098181-002	2.9245466+002	3.1832096+002	1.0773689+002	1.9415440+002	7.9796090+001	6.3616250+001	-2.7493890+001	4.2096563+001
	8	-3.2345924+002	-3.2345924+002	-4.4694883+001	1.2410361-002	-3.1507419+002	1.2599963+002	-2.7305424+001	4.4299997+001	-1.5327974+002
	9	-2.1406675+002	-2.2812005+002	-3.1232257+002	-9.4683290+002	-1.7950095+002	-7.4467931+001	-4.6529365+001	2.5120764+001	8.9014697+001
	10	4.7648240+002	2.2688890+002	3.8712300+001	-1.2768463+002	2.5367157-002	-9.6866409+001	3.6497791+001	-3.6399923+001	-1.2971223-002
	11	8.1864772+001	9.9519951+001	1.1094797+001	3.0897217+001	6.0750536-001	2.1163387+001	1.2405216+001	-8.9634045-001	-3.1611285-001
	12	-1.3774586+002	-6.0017359+001	2.9118858+001	4.5070181+001	-8.0166139+001	2.7835215+001	-1.6391481+001	1.0973510+001	-4.1679321+001
II	13	1.6234864+002	1.7409799+002	-8.8763645-002	4.6143381-002	1.7965051-001	4.1342702+002	1.0943692+001	-9.9264728-002	5.4235856-003
	14	6.0113801+001	1.9474596+002	-3.6477403-001	1.5836756-001	3.8611974-002	2.1738344+001	2.2200005-001	-5.4429933-002	-1.0965929-001
	15	-6.4619940+001	-1.5544576+000	-6.8293280+001	1.3315066+000	6.7082813-001	-6.8826137-002	1.5023923-001	9.4130632+001	-1.0397666-001
	16	-1.7502414+002	-1.5503287+000	-3.9993150+000	-2.6676780+002	-1.5965540-002	-8.1060602+001	-5.2289747+000	9.6557212+001	-4.9695884+000
	17	2.2393232+001	1.6824112+002	-2.9946908+000	-2.6607780+000	-1.5965540-002	-3.1210311+001	2.2894297+000	4.8715634+000	7.8813604-001
	18	1.4153658+002	1.1950707+001	-3.1185729+000	-1.0258063+000	-3.1307785+002	-4.6025171+001	-2.3256210+001	2.1354046+000	-8.0885557+000
	19	3.2338621+002	1.9563791+002	6.4064632+001	-2.3945316+002	-3.1307785+002	-1.4839164+002	-3.1862247+000	8.0071304+000	-4.9387726+002
	20	7.6077984+002	5.8358041+001	6.4064632+001	2.8066512+002	-1.9804391+002	1.0023994+001	2.1010648+000	1.2001820+001	5.2565293+000
	21	-2.0707708+002	7.3642954+001	5.3431877+000	8.0392741+000	-3.1186698+001	-2.6121030+001	4.0173278+000	-1.4626305+001	3.2628874+000
	22	-1.2217881+002	-1.2217881+002	8.6951639+001	-8.0691790+000	-3.4638734+001	-9.9267960+001	-1.4796883+001	-1.6226305+001	-5.4603964+000
	23	-2.0933995+002	-3.0433773+002	2.6923345+000	1.1158814+000	-1.1977046+001	-9.9267960+001	2.4357081+001	-1.1210577+001	-3.0187618+001
	24	-2.0364096+002	4.7783823+002	6.8154916+000	4.9700870+001	2.3568168+002	-8.2229124+001	-1.2112263+002	5.1692129+000	-1.9312825+000
	25	9.3603927+001	4.7924054+002	-2.4009402-002	-2.4406556+002	-4.4586922+001	-6.0342965+001	2.9481418+000	1.6772051+002	2.2871234+002
	26	5.0094445+002	6.0682399+002	-1.4853761+001	1.2855557+002	1.6397885+002	2.2998595+001	-6.3285396+001	-8.0133629+000	6.6900689+001
	27	8.7631461+002	6.1195409+002	-4.5721739+002	-2.2231723+002	-5.8553828+000	3.5542982+002	6.3282298+002	-1.1807231+002	3.0912798+000
	28	-1.5533629+002	-9.3320546+002	-2.1549766+002	-2.3030802+002	-7.1088603+001	-6.1310122+001	1.7043565+000	-2.4332293+000	1.0334740-001
	29	4.9107620+002	-2.6064128+002	3.1074891+001	-1.5087867+002	-6.1115029+002	-7.0322148+001	8.2582232+000	-3.0955234+002	4.4053653-002
	30	-8.3276559+002	-1.2886609+002	3.1536096+002	2.2699130+002	3.6579886+002	-2.0895139+001	7.3132577+001	8.1558660+001	-6.2291271+001
	31	-1.2351475+002	1.4995899+003	-1.8413853+001	-8.3631202+001	-3.7021870+001	-9.6892595+001	-1.1651137+001	1.1257567+002	-5.3225231+001
	32	1.8193078+003	1.0070652+002	8.2654163+001	4.4210909+002	6.1115299+002	1.0817081+001	-1.1131873+002	2.7887007+000	-5.3225317+001
	33	1.9885902+002	1.6730773+002	1.2895683+002	-1.0202116+002	5.3934890+001	6.0807712+000	6.9013872+001	1.0018281+001	2.0564450+002
	34	2.8851518+002	5.1055775+002	1.3604044+001	-9.4229795+001	-1.3215210+002	-5.9013683+001	-3.0718320+001	-3.1522885+001	5.8207702+000
	35	-3.8236467+002	-3.2701909+002	1.9116427+002		1.3604044+001	1.3594310+001	7.2191789+001	-3.9737090+001	2.1877437+001
	36	-6.5699375+002					-2.5071499+001	2.4129981+001	7.1187703+001	1.6985242+000
	37								1.8995408+000	-1.3884820+002
III	39	3.6702566-001	1.3874674-001	-4.1755787-001	1.0560342-001	-3.9520306-002	4.3138967-003	1.4615121-002	3.6262236-003	-4.7900048-002
	40	1.5615684-001	2.2819924-001	-1.8622981-001	-4.1671869-002	7.9828971-003	1.7787416-002	6.2494674-002	-9.9884738-004	-3.7181436-002
	41	1.0907864+000	1.0619097-001	-4.8338374-001	-2.5877724-001	5.4197947-002	-3.5763938-001	-2.9600175-001	4.5664033-001	-1.0342299-001
	42	2.5265849-001	-4.3208272+000	-6.4228237-002	-4.6521697-001	1.0167108-001	1.0562586-001	-1.7655559-001	-4.7426321-002	-1.9369441-002
	43	1.0083456+000	-2.4265849-001	5.0440052+000	-1.1784861-002	1.8037997-002	5.5427101-001	-1.7158674-001	2.4121186-001	6.0391436-001
	44	-9.3388217+000	6.2487410+000	1.1008847+000	9.1534204-001	-8.0745947-002	2.2247701-001	-3.3239824-001	7.1412666-002	2.6863910-001
	45	2.0180151+000	-8.4910930-001	2.4347366+000	9.1151796-001	6.3369831-001	-2.2056080-001	1.0256472+000	-2.0908130-001	2.4866201-001
	46	2.0523120-001	3.2224938+000	1.8439248-001	-6.4134904-001	7.8123904-001	-2.5433315-002	1.4585876-001	1.6087563-002	1.0577317-004
	47	8.3843591-001	1.0720071-001	-1.6093312-001	-1.1321791+000	-4.0890082-002	-5.6975095-002	3.2601079-002	-4.4461266-002	-2.0723251-001
	48	-2.7760558-001	-1.0047363-002	-2.2705230-002	-4.4632889-001	-2.0831111-002	5.2566253-001	2.0181300-002	3.2723319-002	-3.2174455-001
	49	-7.4825360-001	-2.7896451-002	-4.0221084+000	-2.8738863-001	-2.0222964-001	-1.1578928-002	-8.3213042-001	1.5273639+000	7.4603785-002
	50		1.3604044-001	2.1652324+001		9.0315990-001	-2.5071499-001			1.6985242+000
	51					7.3306353+000				

I - Main latitudinal variation. Mixed latitudinal and longitudinal variation: II - First order in longitude, III - Second order in longitude

Notation: For each entry the number given by the first eight digits and sign is multiplied by the power of ten defined by the last three digits and sign.

Harmonic		9	10	11	12	13	14	15	16
	k \ s	5	6	7	8
I	0	8.5938576-002	2.4558040-001	-1.0827119-001	-3.9520306-002	4.3138967-003	1.4615121-002	3.6262236-003	9.4481806-003
	1	1.7118674-001	9.4945689-002	-2.8354701-002	2.3185805-001	1.7787416-002	6.2494674-002	-9.9884738-004	-3.7181436-002
	2	-2.7290557-001	-7.5473441-001	2.9245772-001	3.1859042-001	-5.4944152-005	3.685716-001	-3.091084-001	-1.2259800-001
	3	-1.7113696-001	1.3777845-001	4.8432810-002	-2.5610162-001	1.5588672-001	8.4540593-002	-2.5616019-002	1.2940296-001
	4	1.9321466-001	5.0624496-001	-1.8125138-001	-3.4132976-001	2.4086538-002	-2.7089903-001	2.3384217-001	1.3150914-001

PREDICTED COEFFICIENTS D_SK DEFINING THE FUNCTION Γ(λ,θ,t) FOR MONTHLY MEDIAN f_o F2 (Mc/s)

NOVEMBER 1965

TABLE 2

TIME VARIATION

Column grouping — Harmonic: 0 → s = 0; Harmonic 1 → s = 1, 2; Harmonic 2 → s = 3, 4; Harmonic 3 → s = 5, 6.

GEOGRAPHICAL VARIATION — I (Main latitudinal variation), k = 0…8

k\s	0	1	2	3	4	5	6
0	2.9521152+000	-1.4805428-001	-2.4497216-001	4.3152253-002	-8.6312286-002	5.0317515-002	-3.2069557-002
1	4.1240022-001	9.1516636-002	1.4605404-001	-1.3171598-001	1.1312150-001	-2.3850178-001	-7.7838052-002
2	-1.8586595+000	1.1772650+000	2.2088971+000	-2.8544626-003	-4.1715491-002	-8.0658180-001	-2.4438170-001
3	-5.3650625+000	-4.5881100-001	1.6978286+000	-6.5762851-001	-6.0194028-001	1.0466718+000	1.4627594-001
4	-6.8847719-001	-3.1243193+000	-4.3841178+000	4.6236202-001	1.7153316-002	2.9728818+000	9.4769066-001
5	4.9781095-001	8.4582517-001	-2.6611901-001	1.1578758+000	1.1841946+000	-1.5808361+000	-1.2485659-001
6	5.8755407+000	3.7908123+000	3.6828343+000	-2.1387268-001	6.0515399-001	-4.0614769-001	-1.0644746+000
7	-2.0622197-001	-4.7219089-001	1.1909072+000		-6.6178229-001	7.7292577-001	5.6902205-002
8	-2.2646202+000	-1.6768715+000	-1.2128507+000	-5.4522048-001	-4.9762898-001	1.8283418+000	4.0728238-001

GEOGRAPHICAL VARIATION — II (First order in longitude), k = 9…26

k\s	0	1	2	3	4	5	6
9	1.6190037-002	-5.8611733-003	1.7598092-002	-2.3303433-002	7.9473457-003	3.4955029-003	-1.1692524-003
10	-1.2576693-001	-2.4847181-002	-2.7803541-002	1.2527804-002	-2.2295648-002	7.4599094-002	6.6784302-003
11	-2.1645525-002	-1.4162662-001	9.0863731-002	5.9507879-002	1.1472572-001	3.2468408-002	2.8032214-002
12	-4.3807381-001	-4.5200565-001	-8.3147808-001	2.1684036-001	-7.7681046-002	1.5807281-001	8.7217819-002
13	1.3352801-001	6.1800518-001	6.0761272-002	3.6404043-001	-3.3154190-002	-1.2013993-001	4.3234283-001
14	1.7521762+000	5.1118383-001	-5.9014690-002	-2.8409115-001	7.4409994-002	-1.1351173-001	1.9205352-002
15	2.6820545-001	5.0380805+000	-2.6028212-001	-5.1610179-001	-4.7966316-001	-1.4796518-001	-4.3209582-001
16	1.8824449+000	2.3268291+000	-6.8970428-001	-1.1733636-001	6.5414388-002	-8.4395700-001	-6.3301345-001
17	1.8882391+000	-2.2341317+000	4.0328510-001	-1.3823834+000	-5.8863438-001	8.1804273-001	-1.7777285+000
18	-7.1277024+000	-5.6946164-001	-8.5255502+000	1.4028501+000	3.4771397-001	4.4990710-001	1.6669869-001
19	-1.1885014+000	-6.2687998+000	2.1689365-001	2.2034116+000	6.3506310-001	4.5471250-001	1.1339262+000
20	-5.4701636+000	-4.7820483+000	-2.9105707+000	2.0315555+000	1.1260280-001	-1.6426593+000	1.2388331+000
21	-3.8534699+000	3.1831725+000	-3.6459162-001	4.1520969-001	1.7136002+000	-6.4916760-001	2.2024353+000
22	1.1027699+000	7.1229689-003	9.5033573+000	-1.7612043-001	-1.2617152+000	1.1343612-001	-3.7648530-001
23	1.0025806+000	3.9488825+000	-1.3021676-001	-1.3518263-001	-2.4233810-001	-8.7802649-001	-7.4302729-001
24	2.2069130+000	3.1005041+000	1.9998865+000	-1.0524511+000	-1.0262896-001	9.4935772-001	-6.5800955-001
25	2.4113836+000				-1.1690500+000		-8.2734960-001
26	-5.7401531+000	-1.4808436+000		-5.9381676-001	9.0695740-001	3.1082504+000	2.0602967-001

GEOGRAPHICAL VARIATION — III (Second order in longitude), k = 27…36

k\s	0	1	2	3	4	5	6
27	-5.4328809-002	-1.3346057-002	-6.2933072-003	1.7975253-002	-4.4365749-003	1.7845729-002	5.7247081-002
28	-1.5711038-002	-8.0951165-003	-1.0945265-002	-1.9047739-003	3.3995172-003	1.6244797-002	5.5460903-003
29	-1.2265624-001	-5.5490208-002	-1.0881025-001	4.2912942-002	-3.1650904-002	-1.5642026-003	3.6839670-003
30	-1.8506448-002	-3.8896482-004	-6.9525114-002	2.3731431-002	-5.9988924-002	-1.2535117-002	-2.1771506-002
31	1.9000242-001	-3.4608603-003	-1.9097768-001	-7.1350955-002	-2.7092464-003	-5.8379378-002	-1.1675981-001
32	2.0163141-002	1.1687461-001	3.6160307-002	-7.3507708-002	2.7626481-003	-6.4860106-002	1.0560910-002
33	2.7561900-001	2.2494511-001	2.3470747-002	-1.7057387-002	3.1275189-003		-7.9497055-003
34		1.9485921-002	1.6430119-001	-9.0072094-003	1.1758190-001		-6.2588117-002
35			6.8223602-001	2.5191639-002			1.6884829-001

GEOGRAPHICAL VARIATION — I (lower block)

Column grouping — Harmonic 4 → s = 7, 8; Harmonic 5 → s = 9, 10; Harmonic 6 → s = 11, 12.

k\s	7	8	9	10	11	12
0	8.3431025-003	1.5274757-002	7.7906031-003	2.5692969-002	-1.1768355-002	-5.3084742-003
1	5.9207035-003	-6.9213815-002	2.9988686-002	4.1042245-002	-1.3907873-002	3.6773675-002
2	-1.0713010-002	-2.7661801-002	-1.0232845-002	-3.7445560-002	2.2584384-002	1.0443665-002
3	-4.5876954-003	6.6638090-002	-3.0428092-002	-5.4836919-002	1.8844980-002	-3.6152035-002

I - Main latitudinal variation. Mixed latitudinal and longitudinal variation: II - First order in longitude, III - Second order in longitude.

Notation: For each entry the number given by the first eight digits and sign is multiplied by the power of ten defined by the lost three digits and sign.

PREDICTED COEFFICIENTS D$_{SK}$ DEFINING THE FUNCTION $\Gamma(\lambda,\theta,t)$ FOR MONTHLY MEDIAN M(3000)F2 NOVEMBER 1965

LONGITUDE
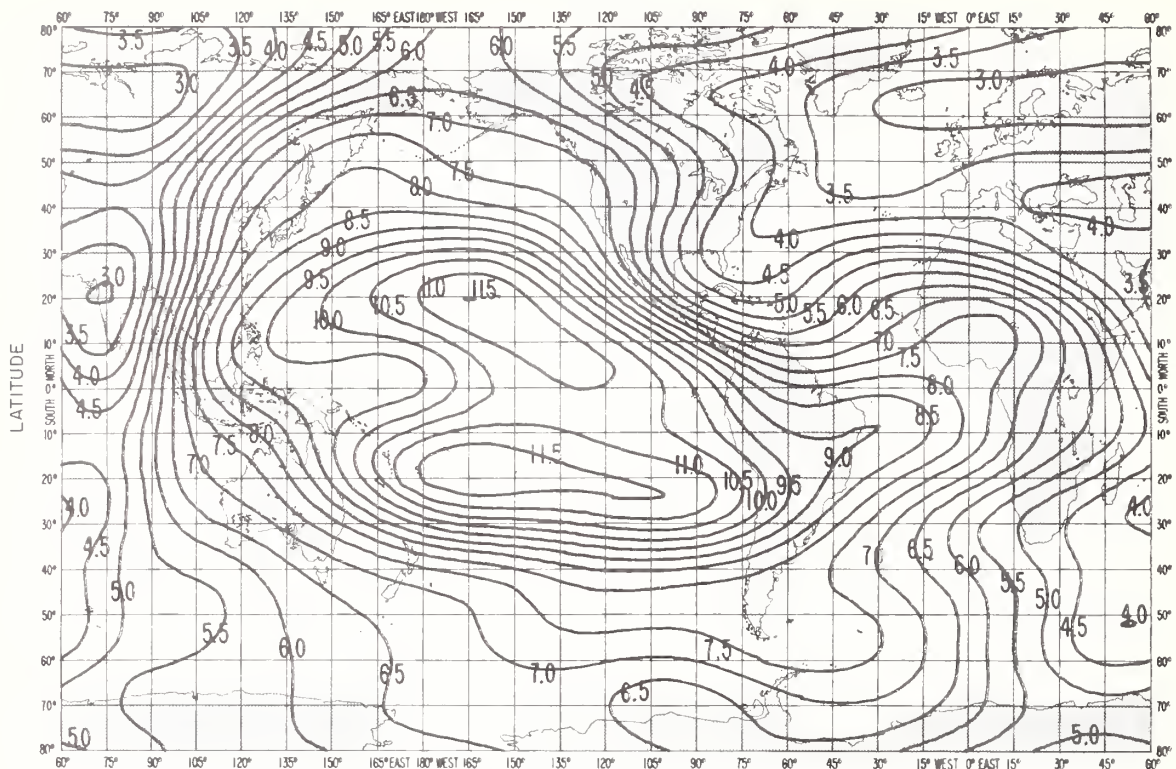
FIG. 1 A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

LONGITUDE
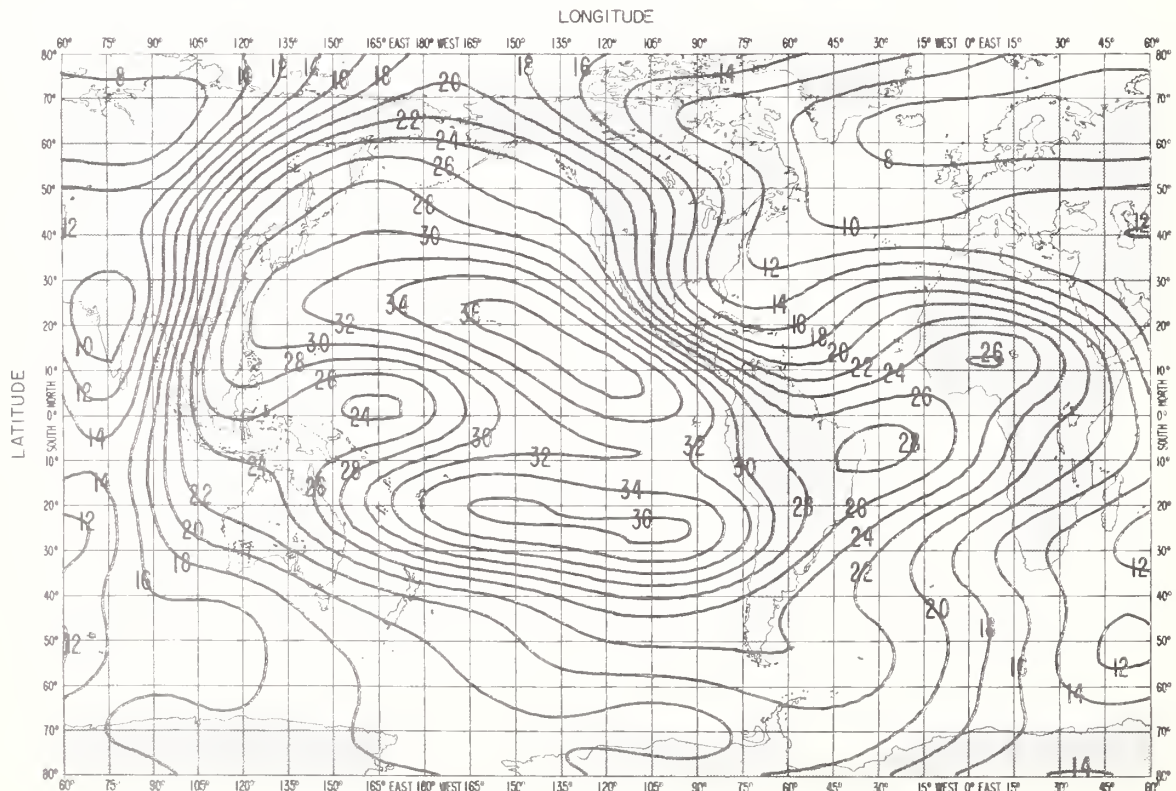
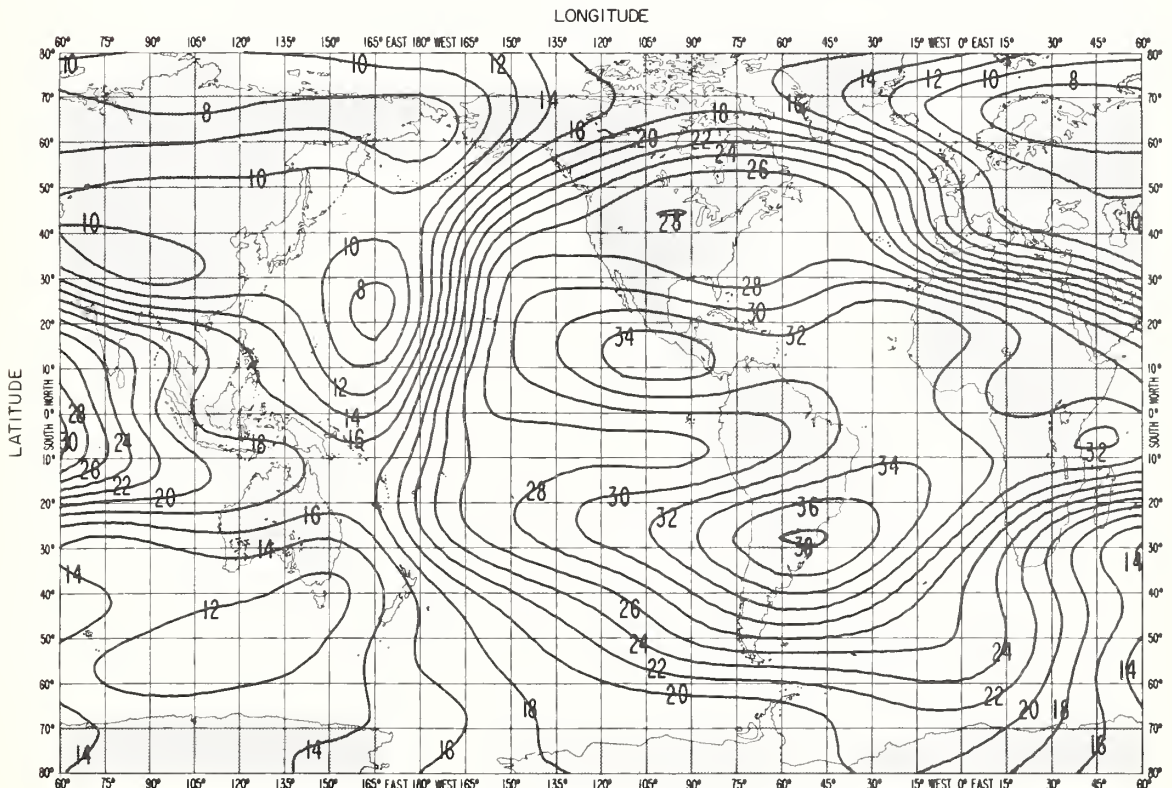FIG. 1 B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

LONGITUDE
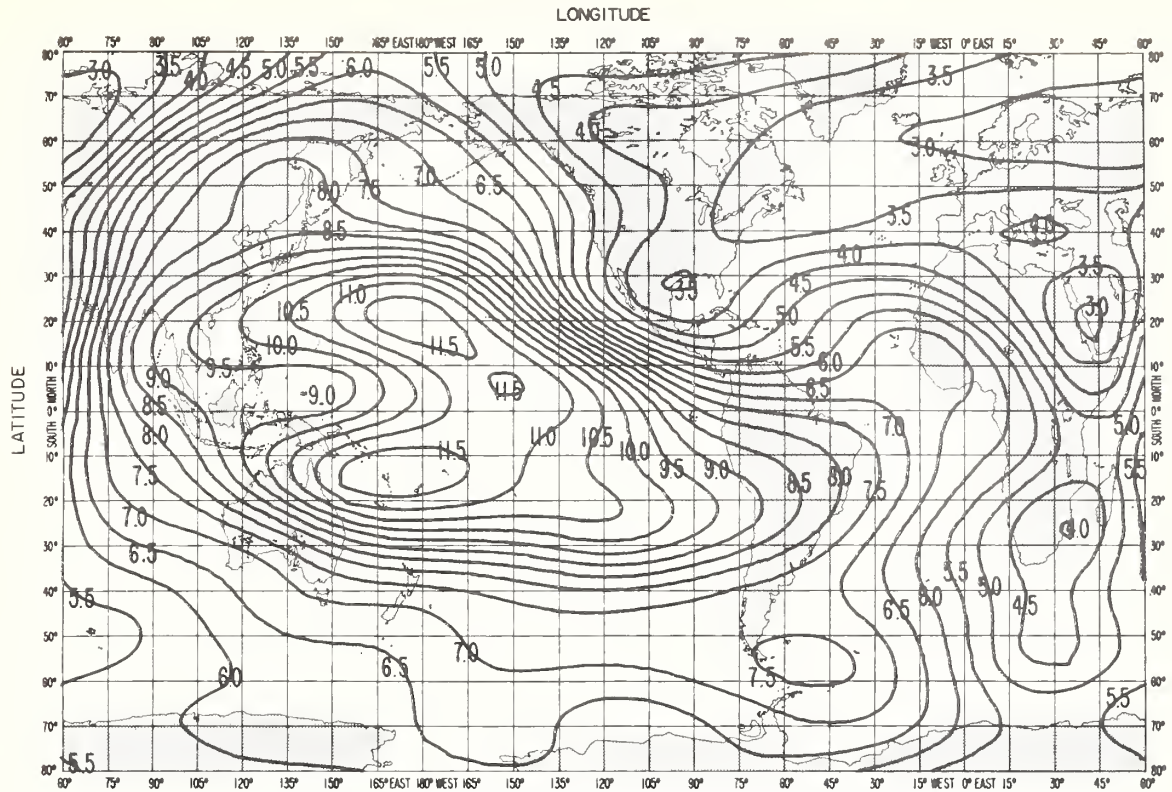
FIG. 2 A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

LONGITUDE
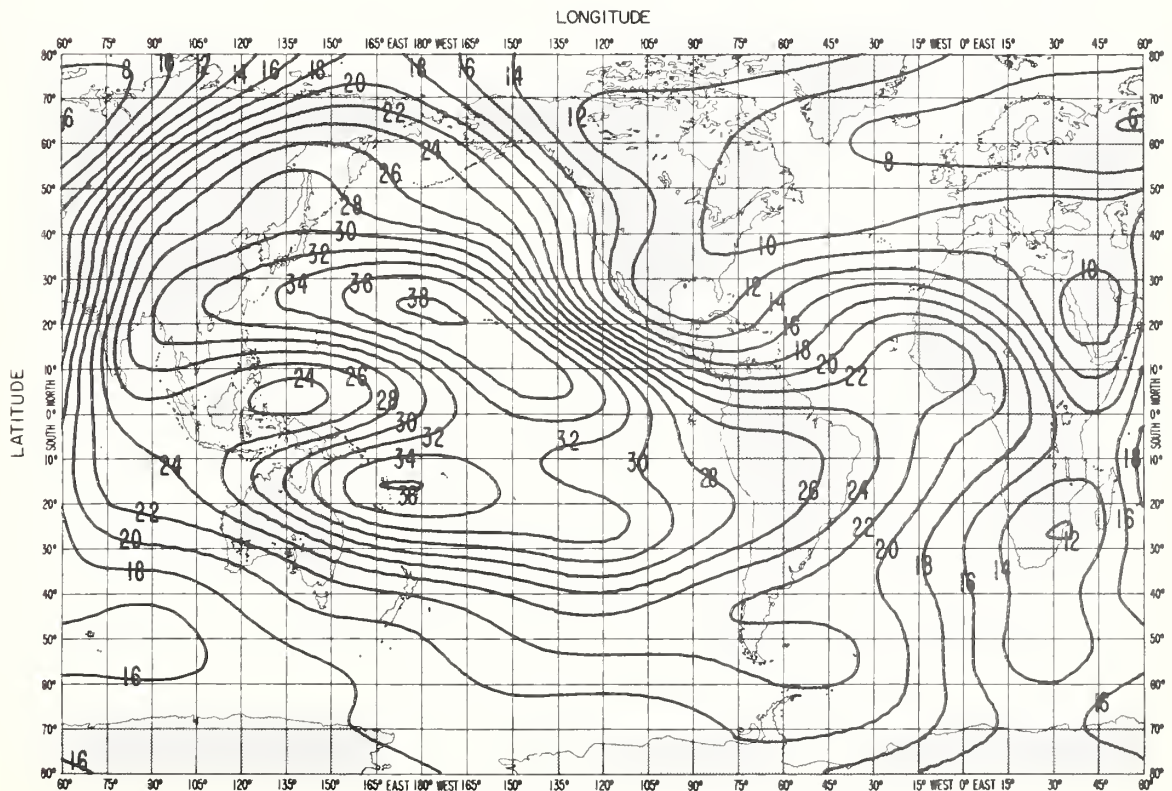
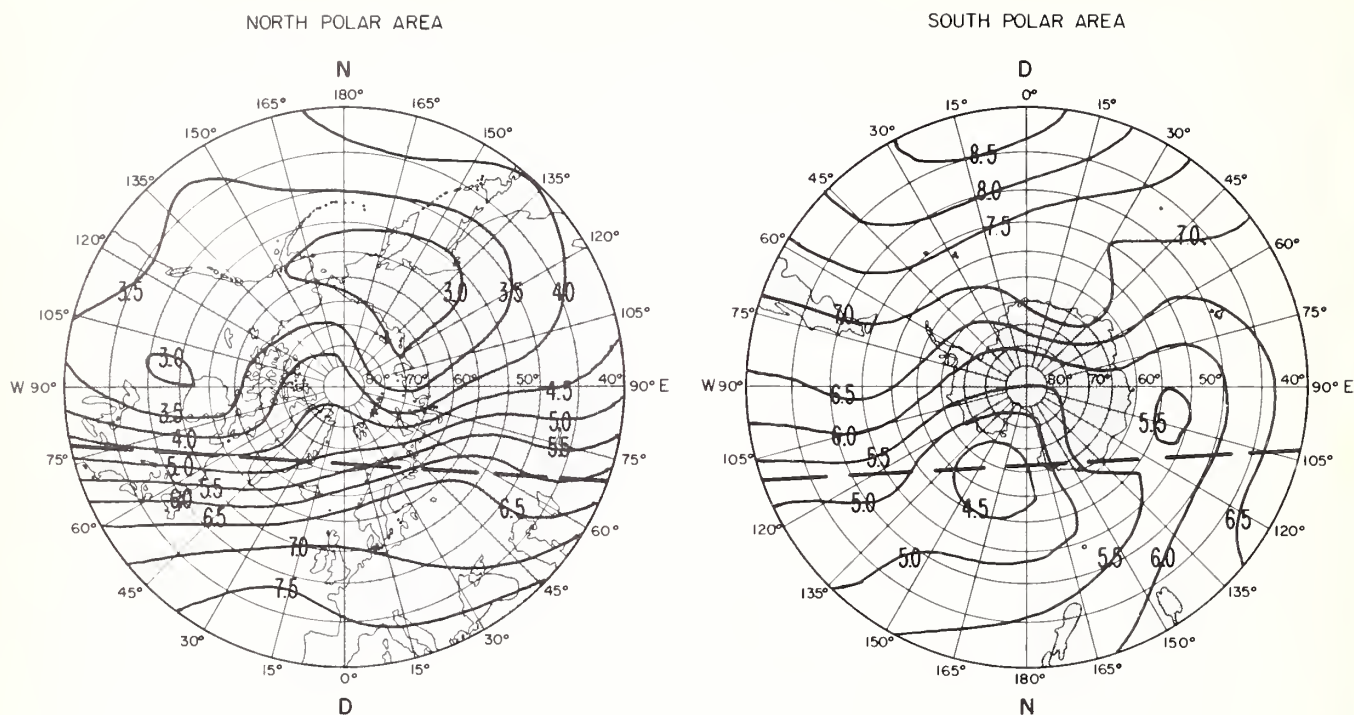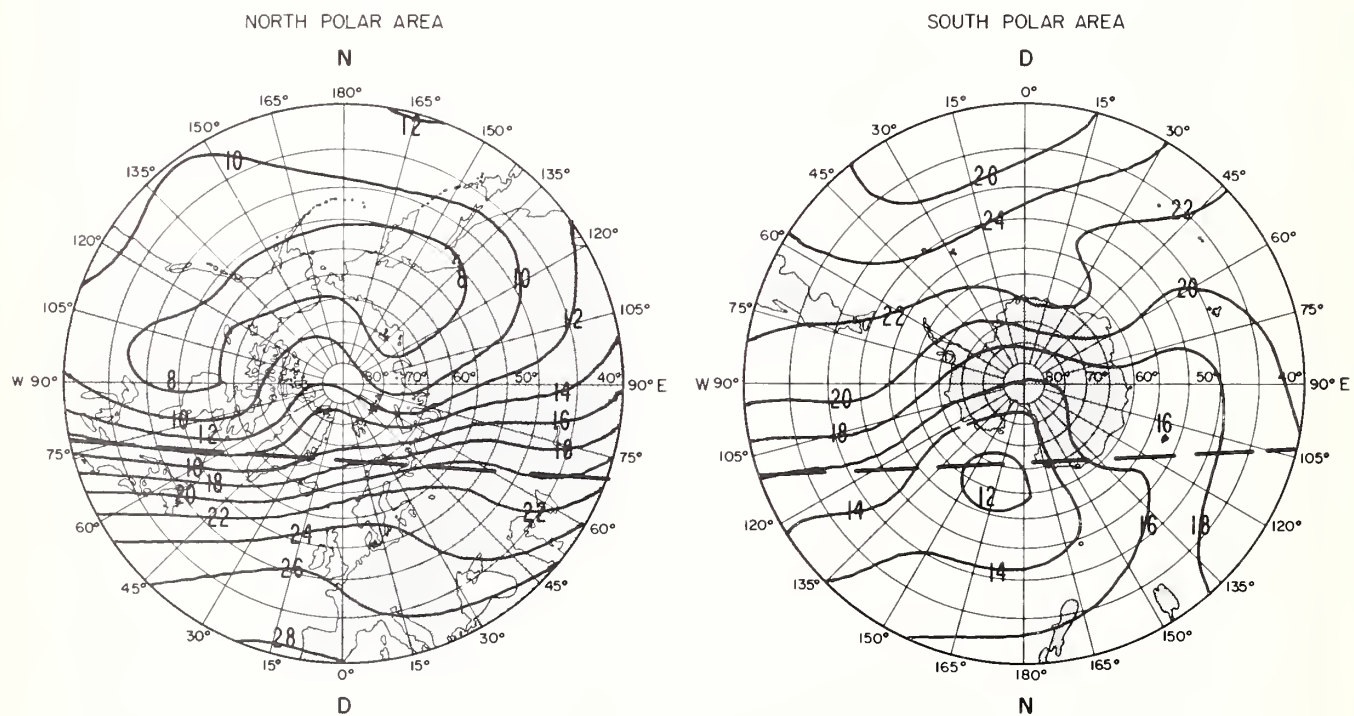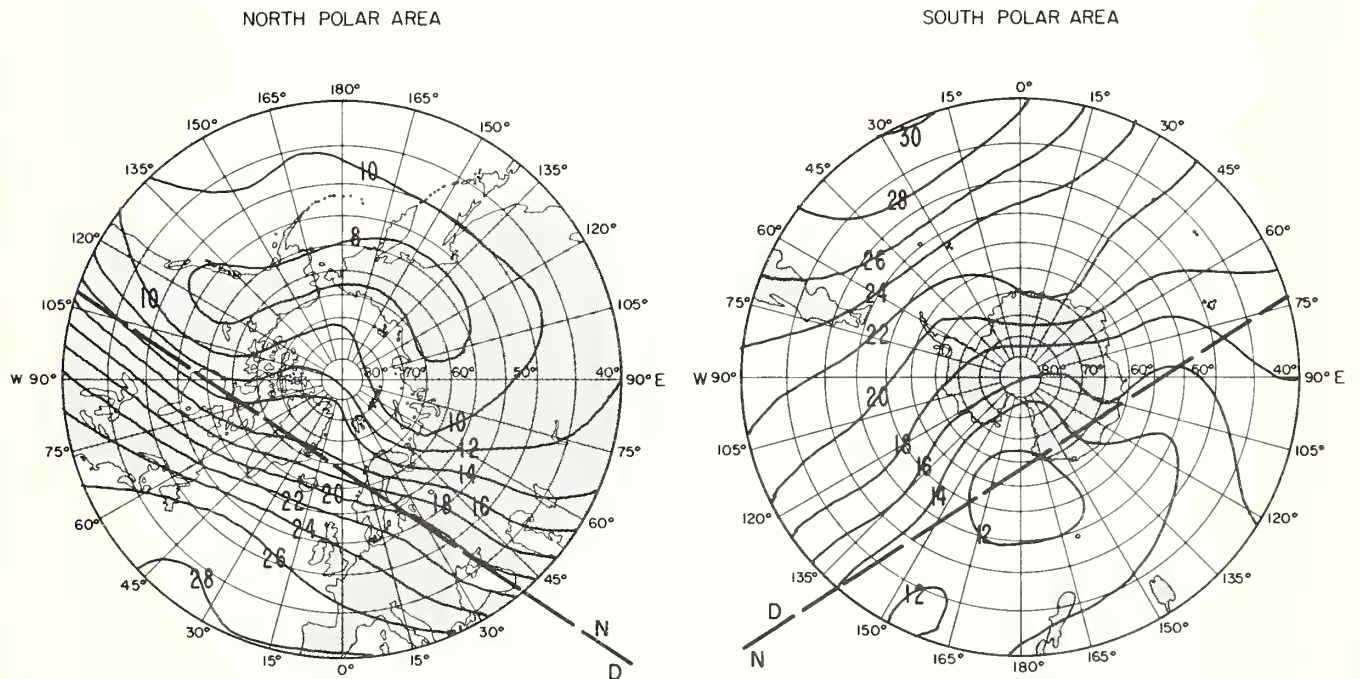FIG. 2 B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)
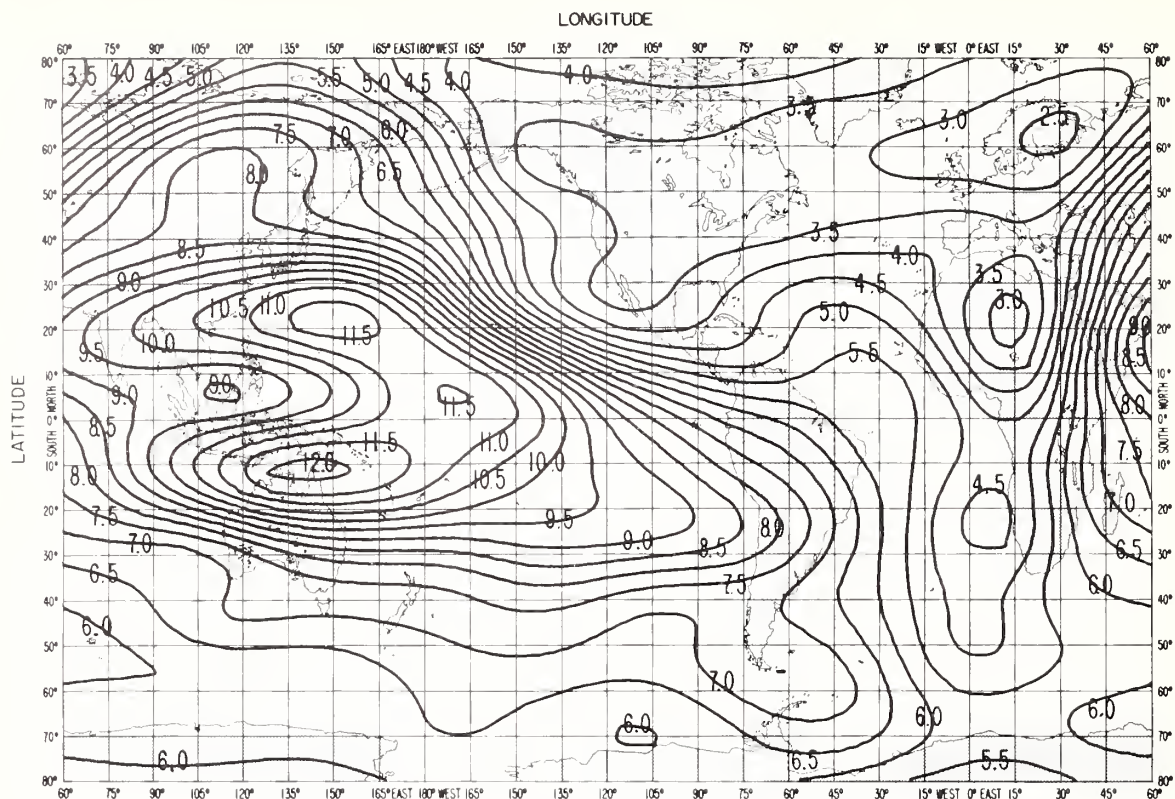
LONGITUDE

FIG. 3 A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)
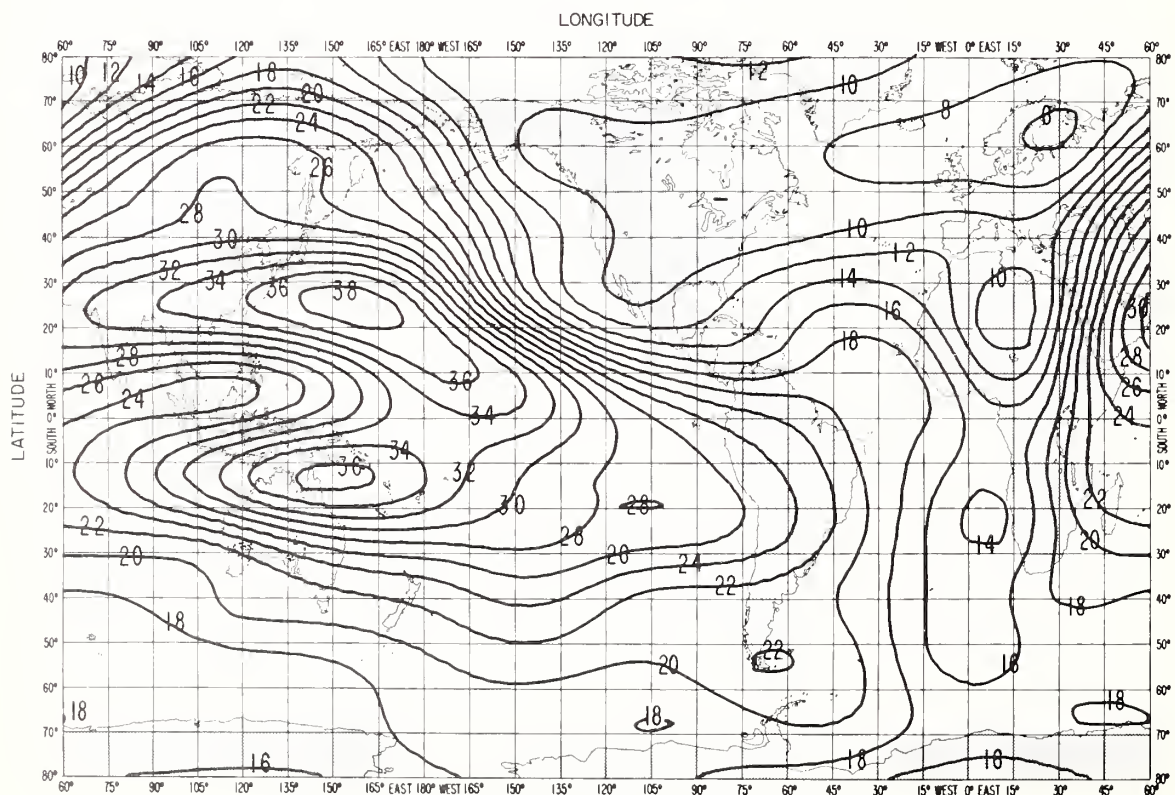
LONGITUDE

FIG. 3 B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)
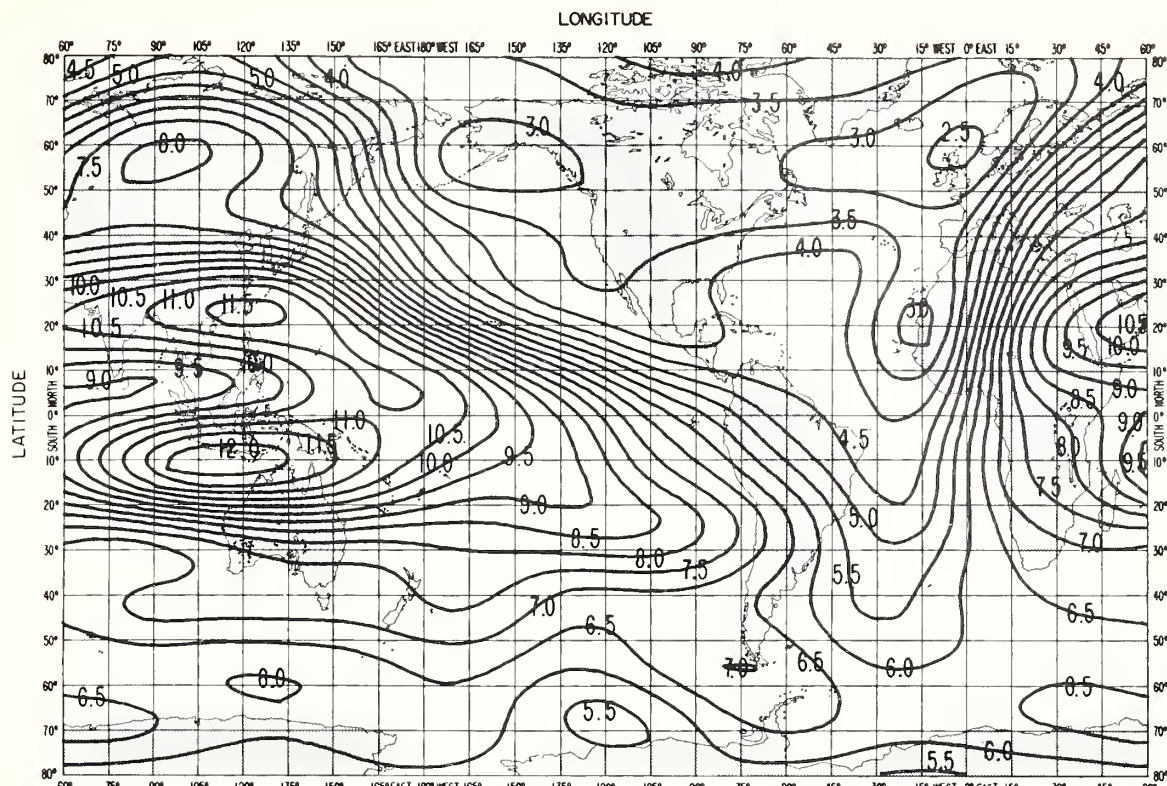
LONGITUDE

FIG. 4A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)
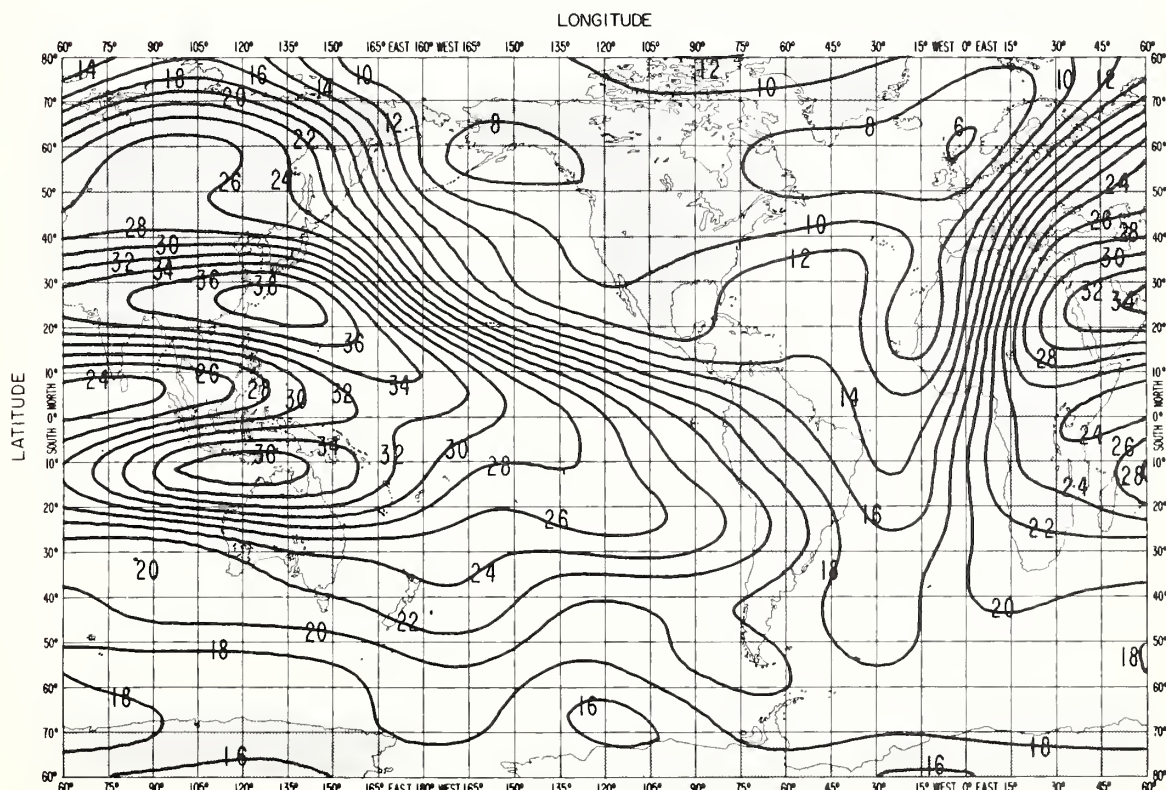
LONGITUDE

FIG. 4B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NOVEMBER 1965   UT = 08
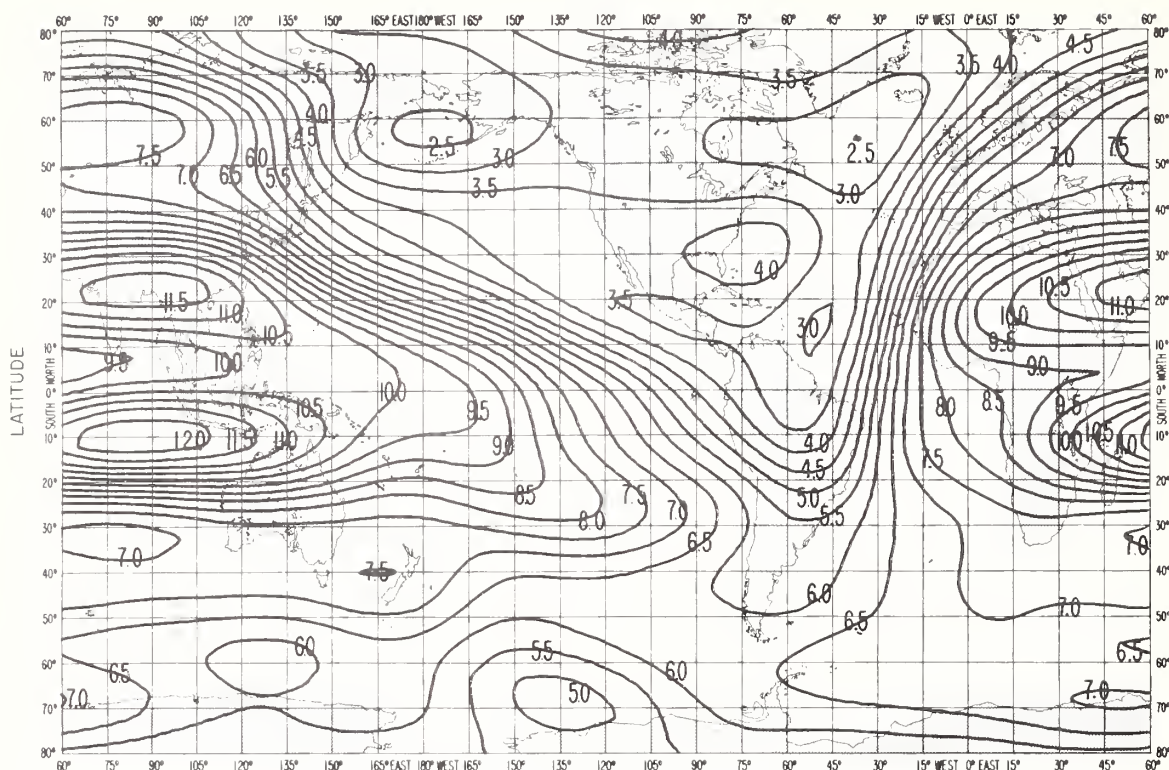
FIG. 5 A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)
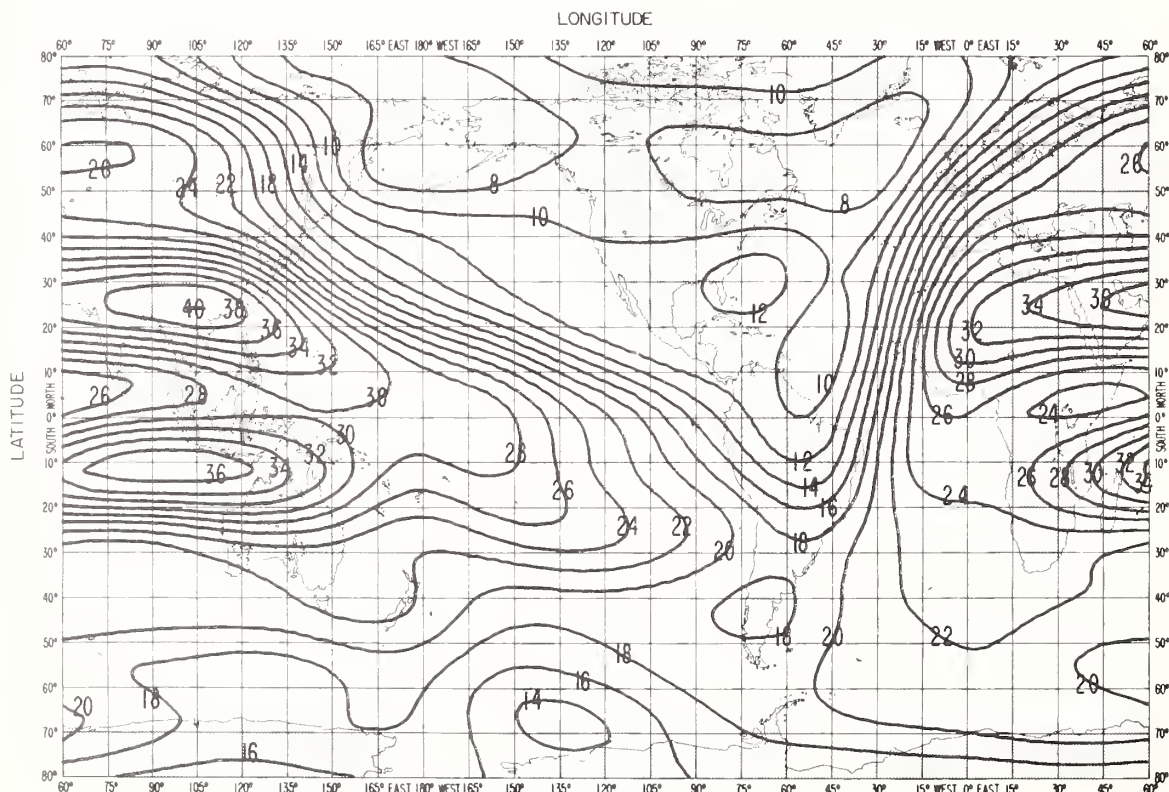
FIG. 5 B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)
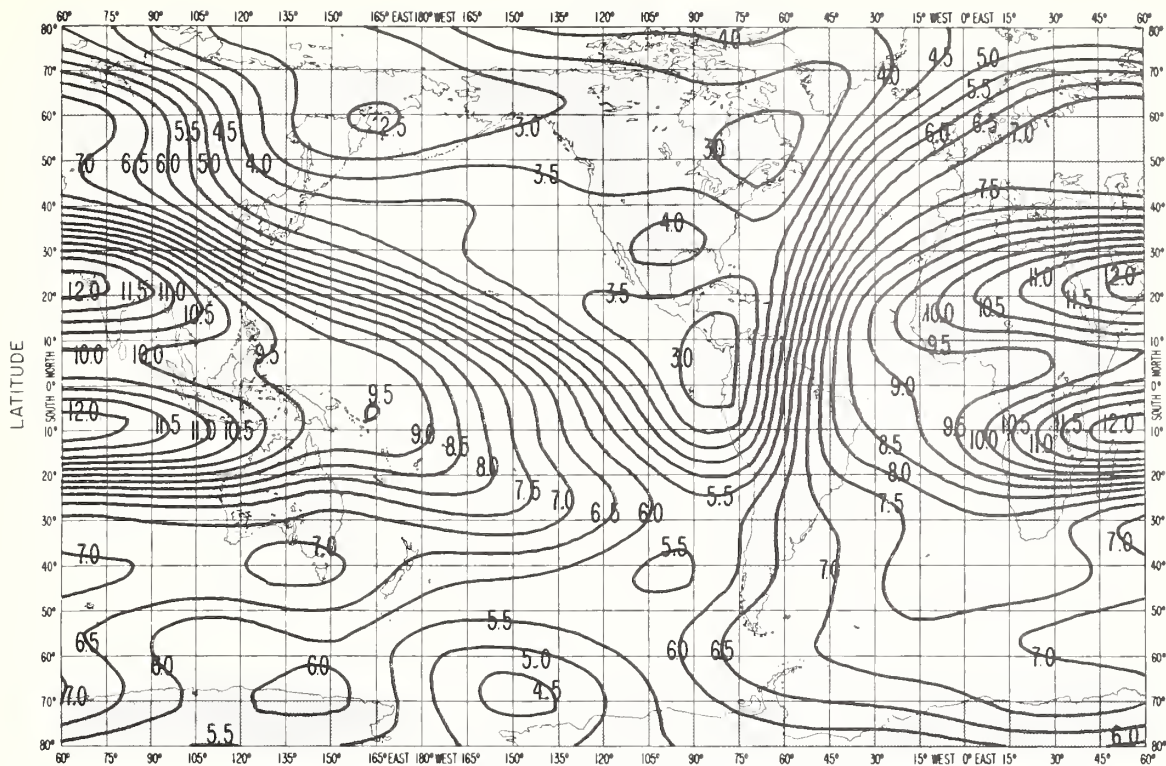
FIG. 6 A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)
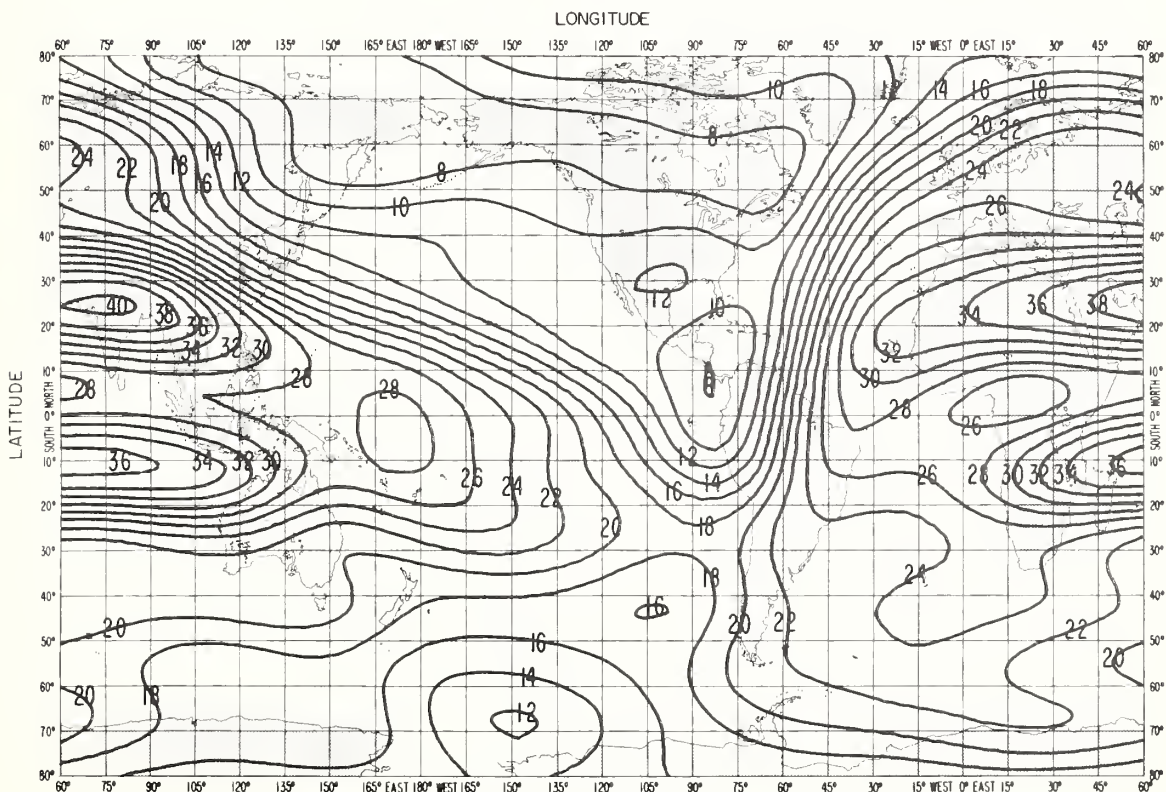
FIG. 6 B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NOVEMBER 1965   UT = 12
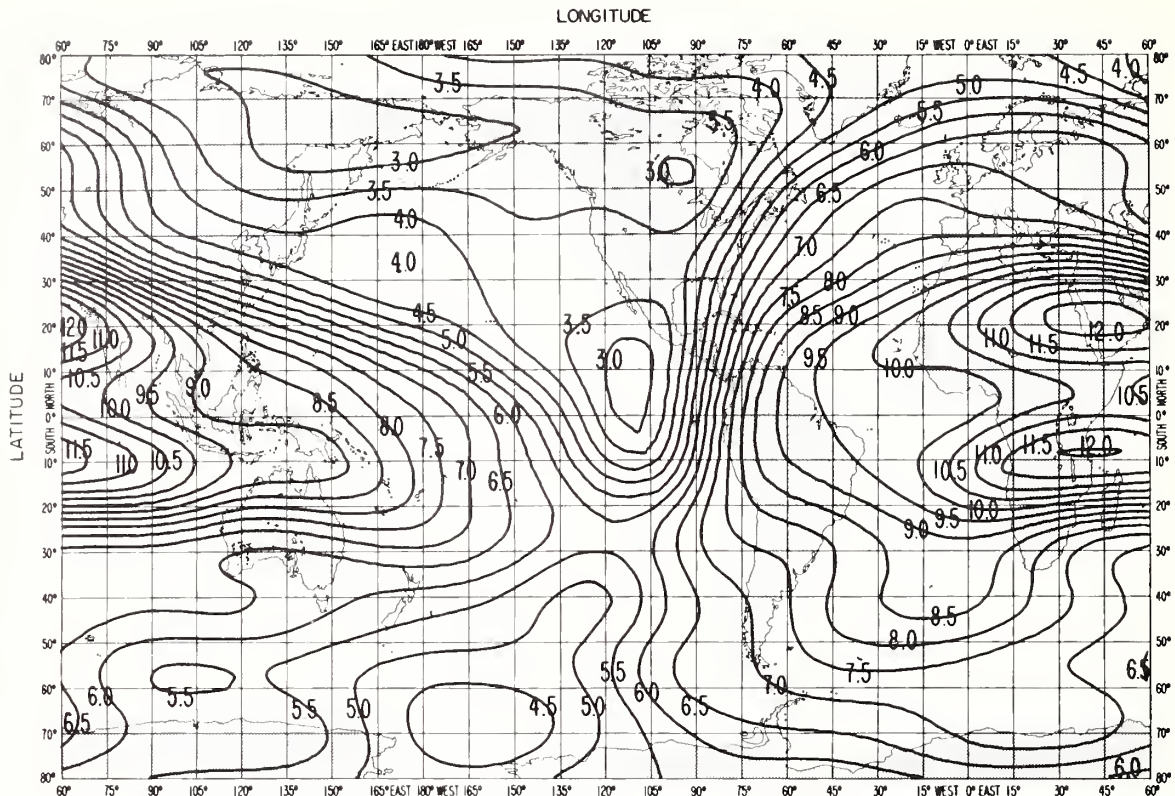
FIG. 7A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)
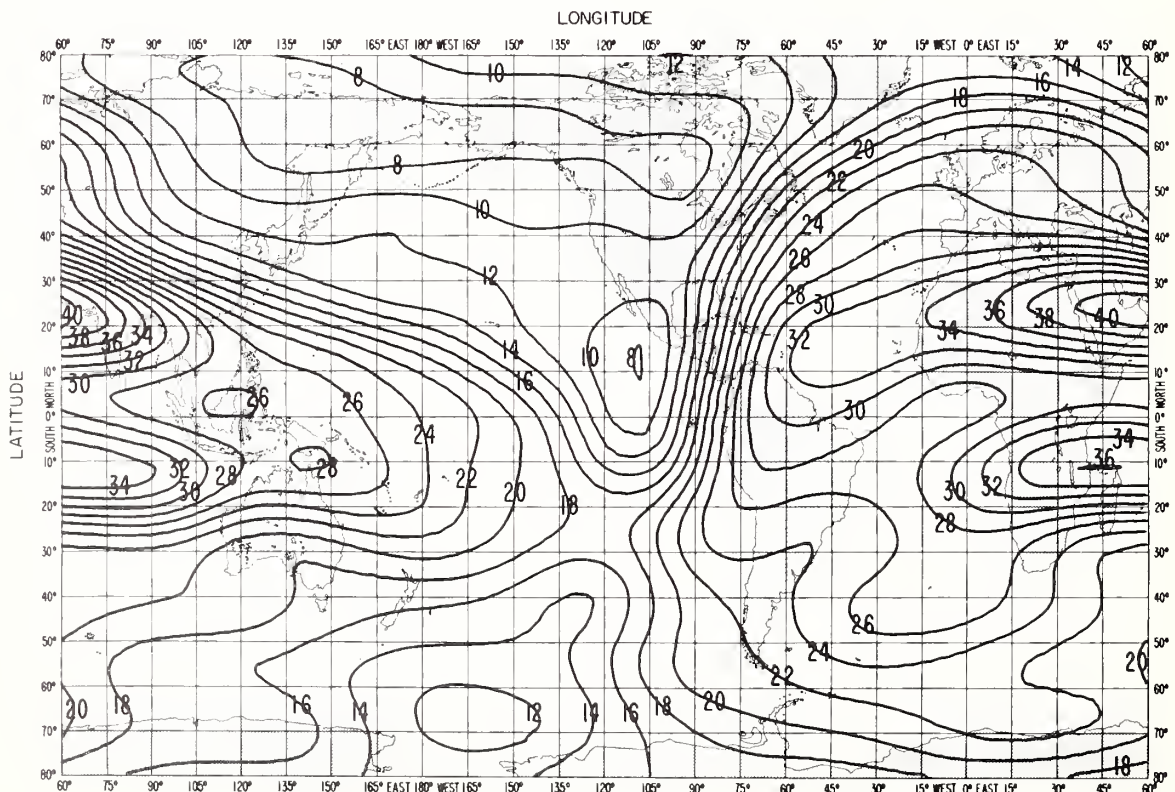
FIG. 7B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NOVEMBER 1965   UT=14

LONGITUDE

FIG. 8A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

LONGITUDE
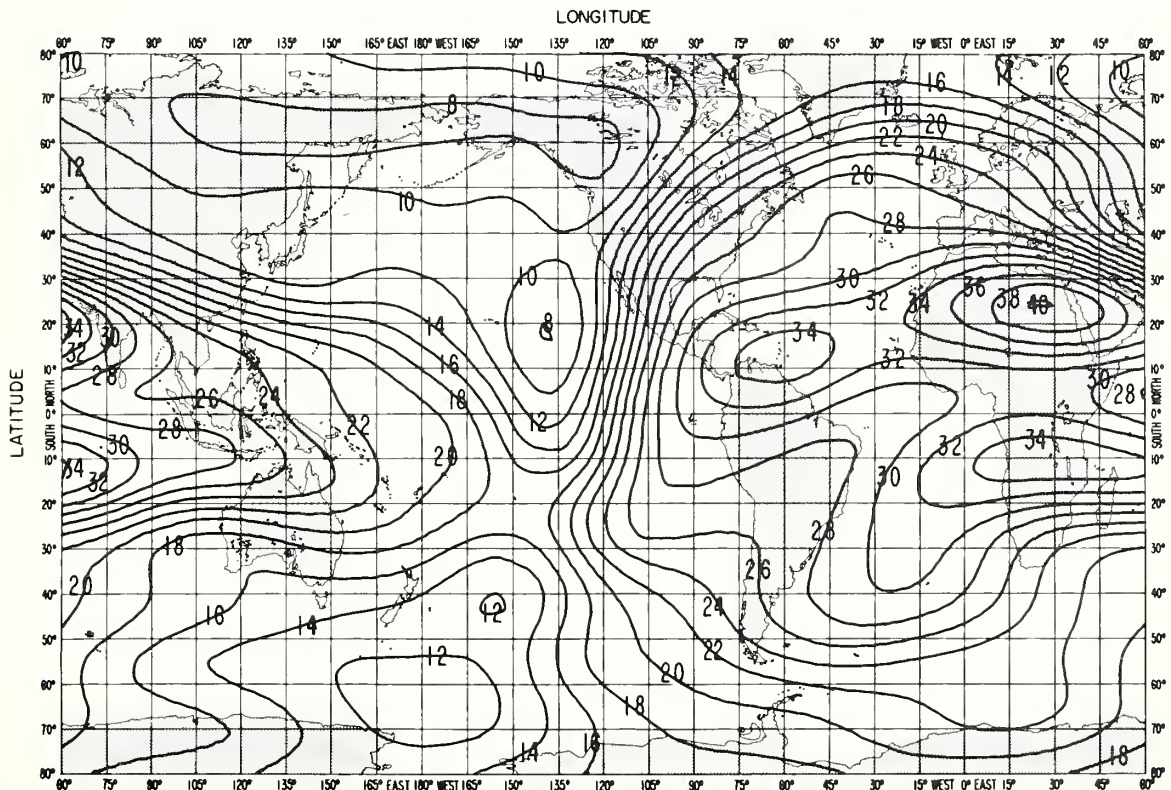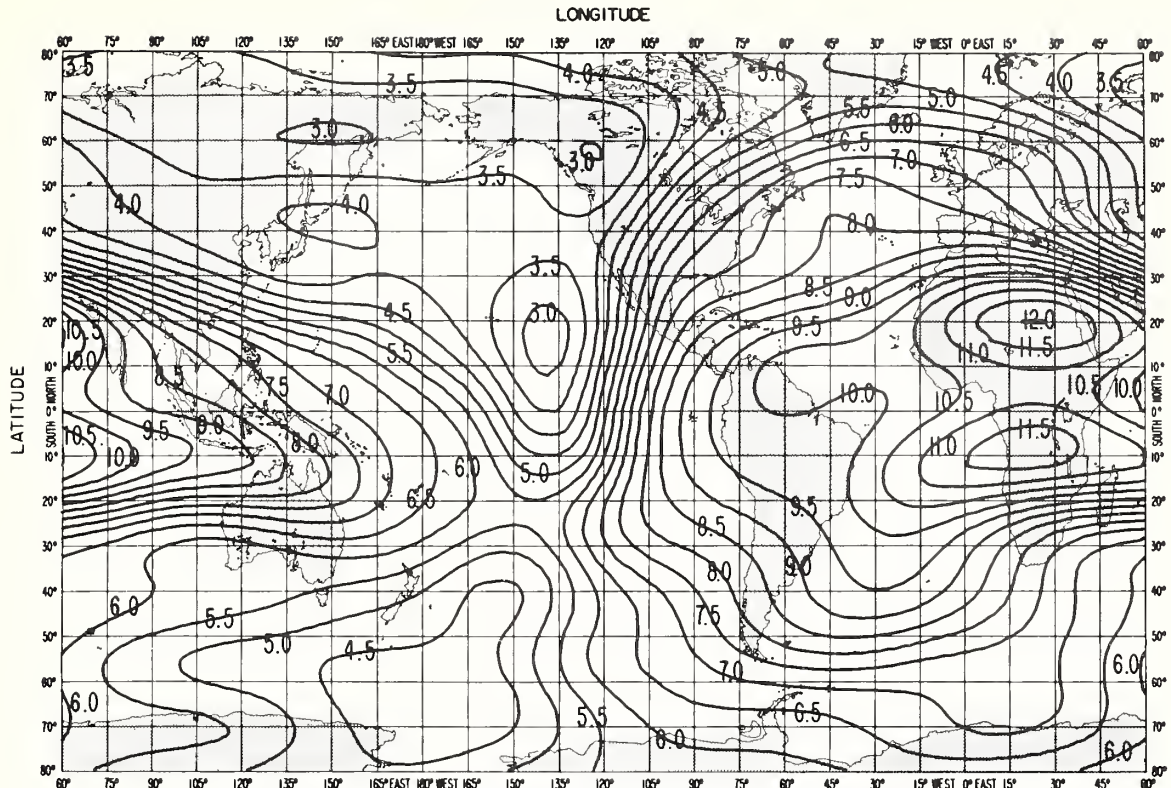
FIG. 8 B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)
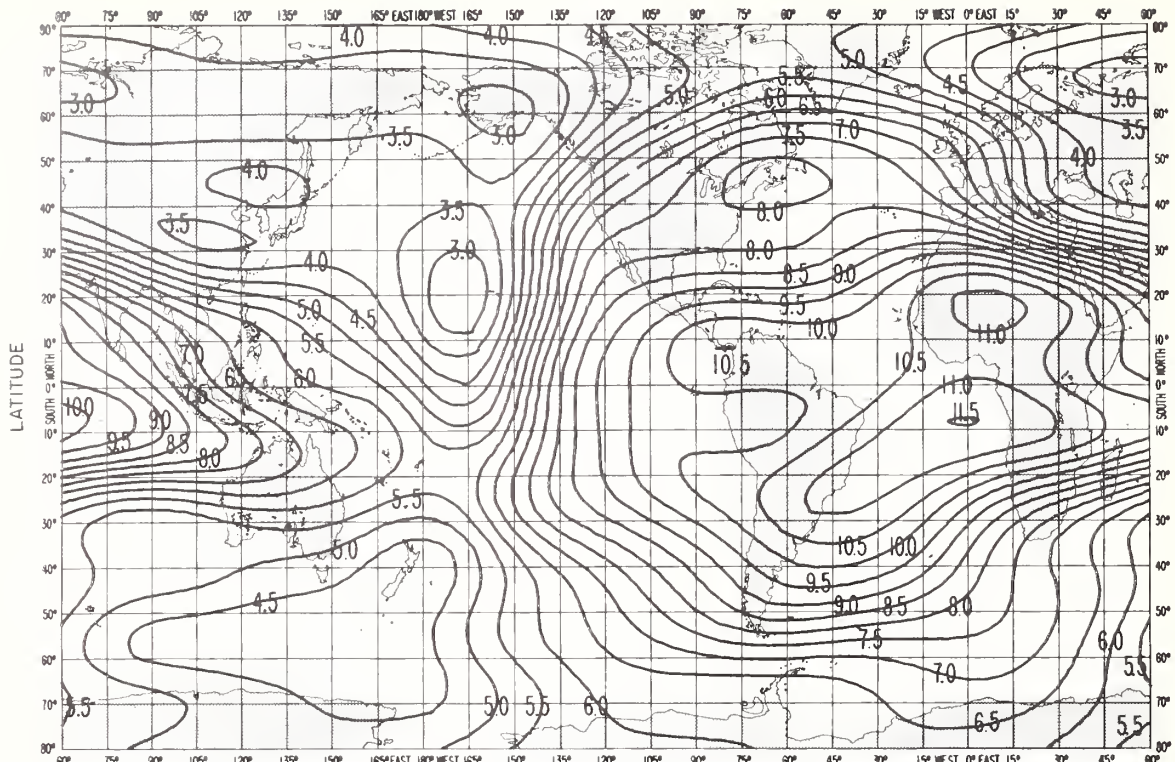
LONGITUDE

FIG. 9 A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)
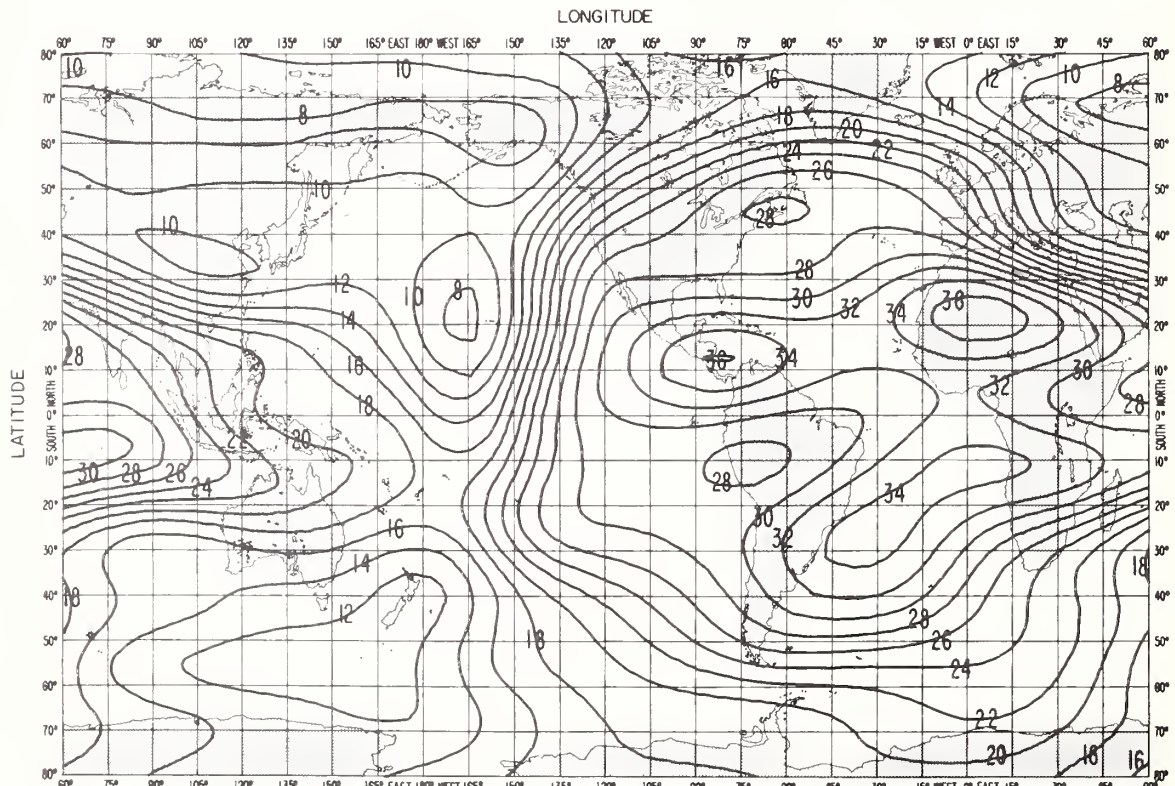
LONGITUDE

FIG. 9 B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)
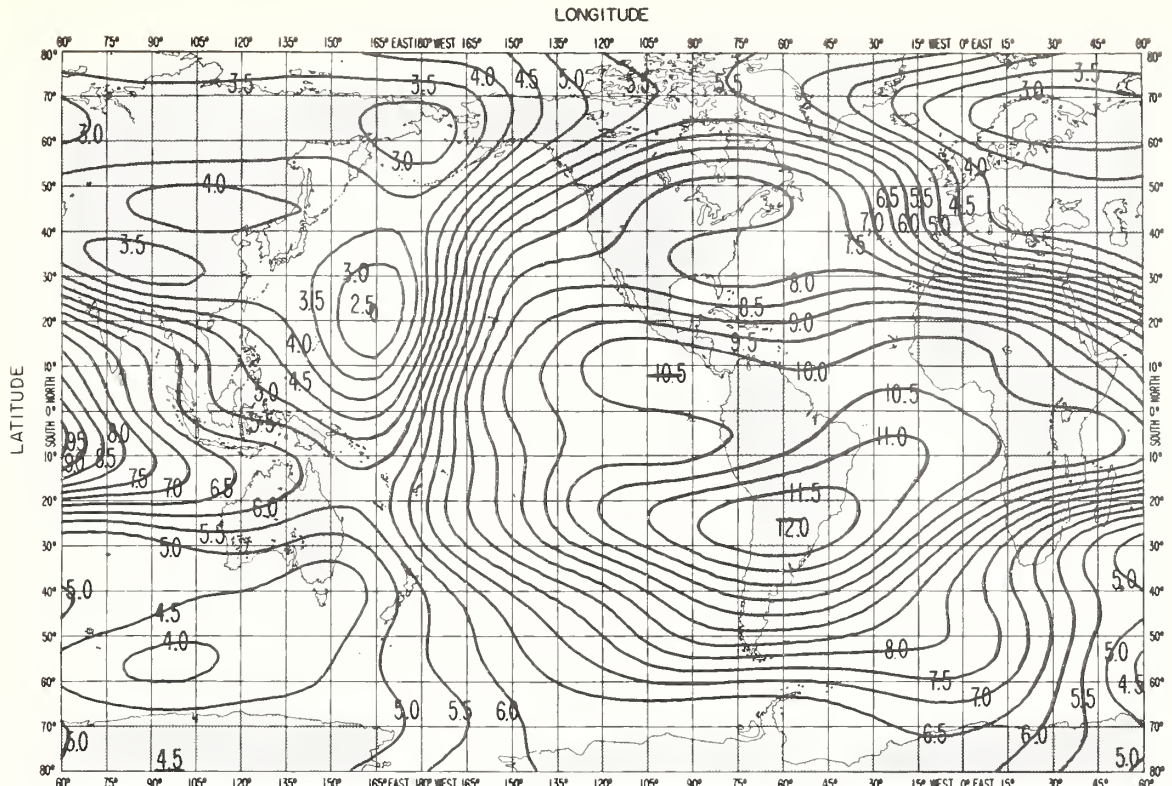
LONGITUDE

FIG. 10 A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

LONGITUDE

FIG. 10 B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

LONGITUDE

FIG. II A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

LONGITUDE

FIG. II B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

LONGITUDE

FIG. 12 A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)

LONGITUDE
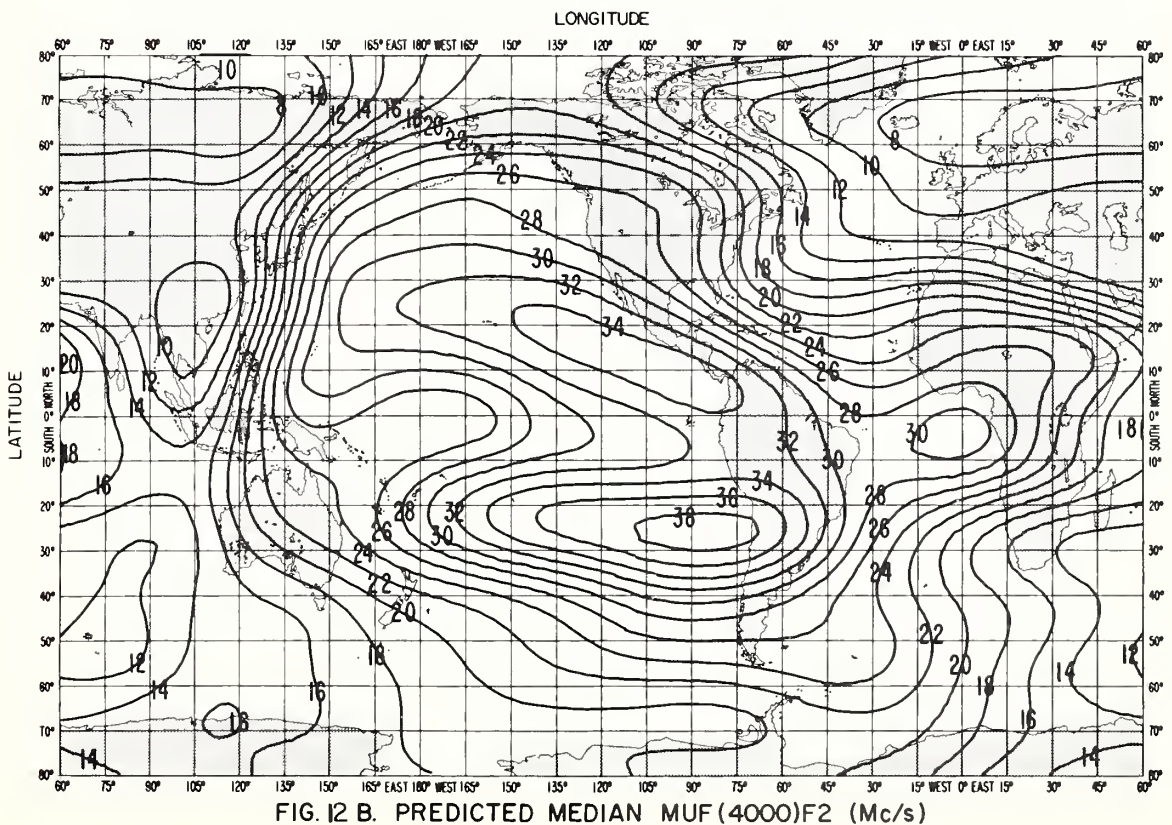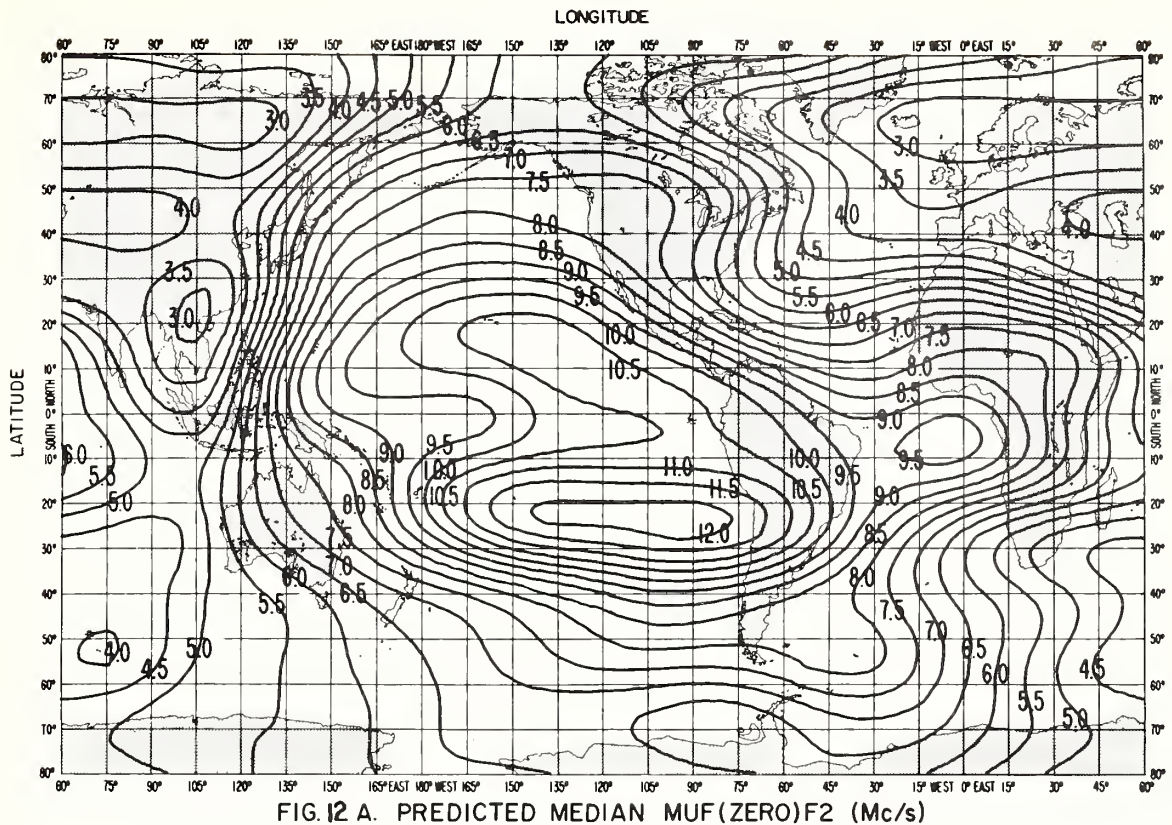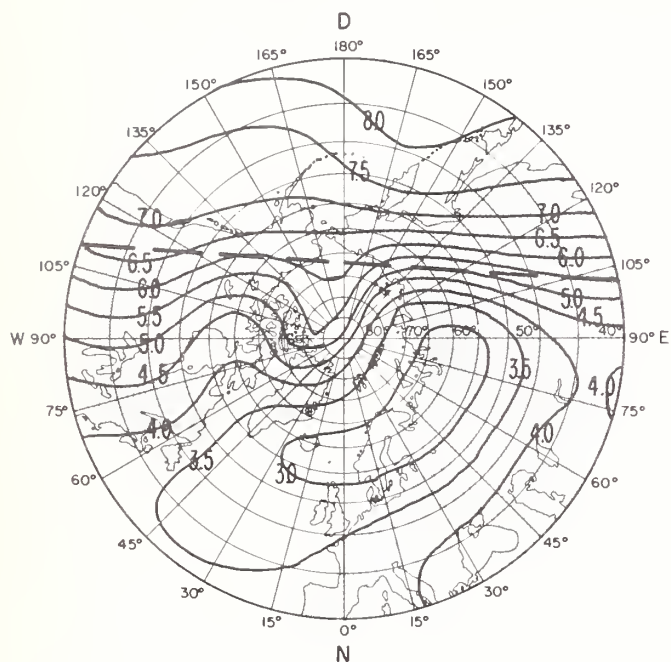
FIG. 12 B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)
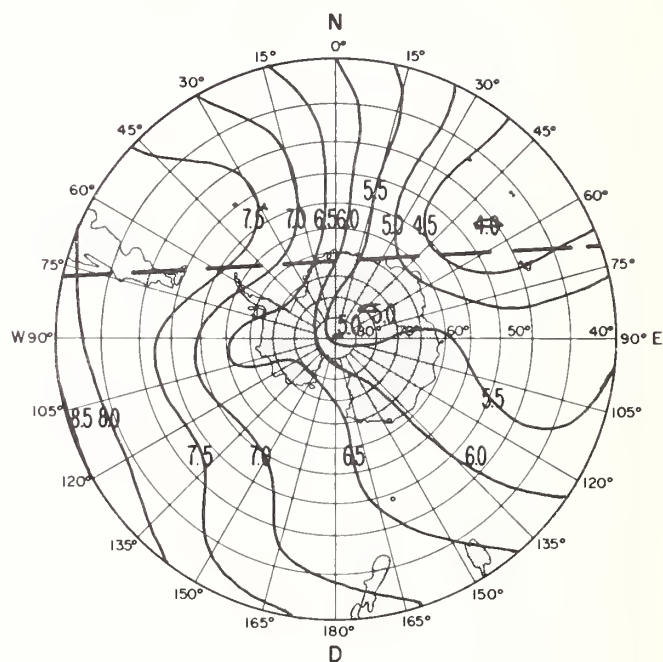
NOVEMBER 1965 UT=00

FIG. 13A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/S)
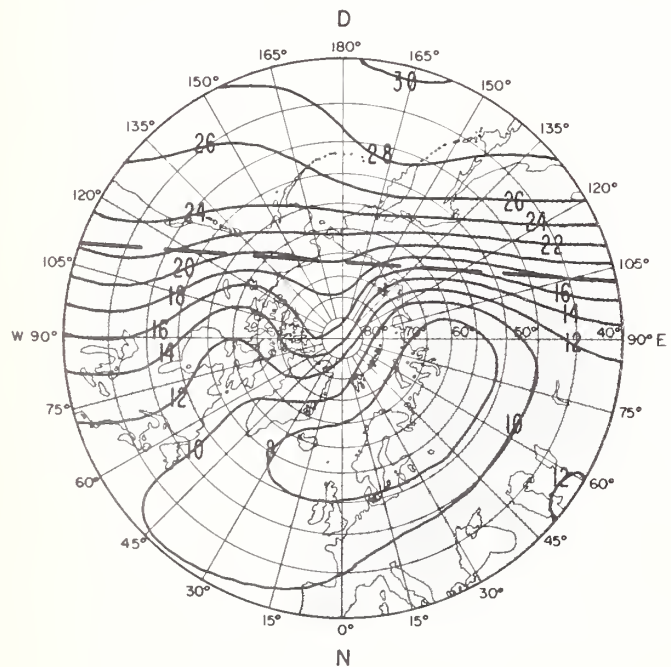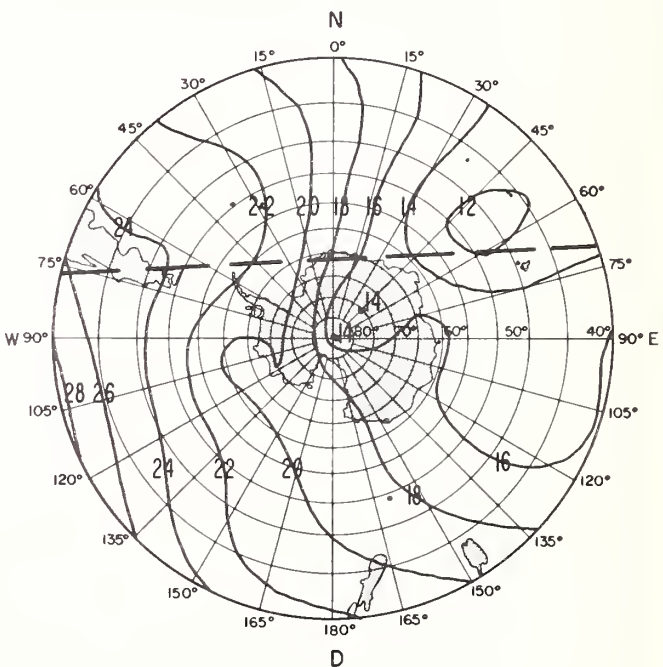
FIG. 13B. PREDICTED MEDIAN MUF (4000)F2 (Mc/S)

NOVEMBER 1965 UT=02

NORTH POLAR AREA
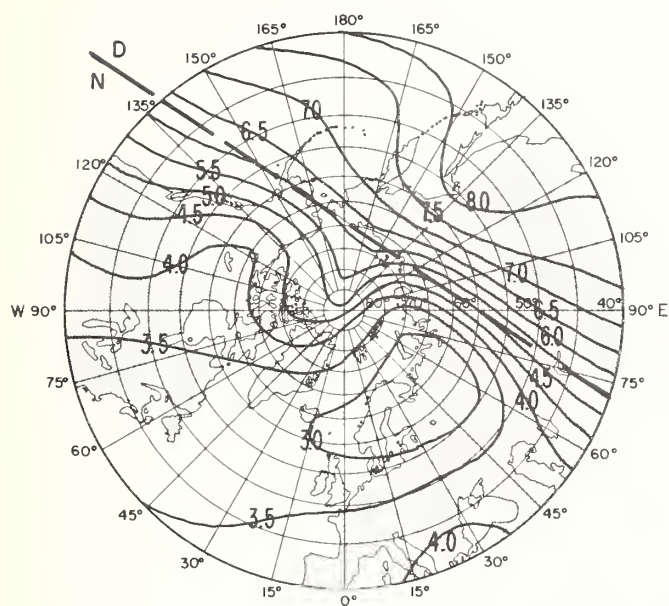
SOUTH POLAR AREA
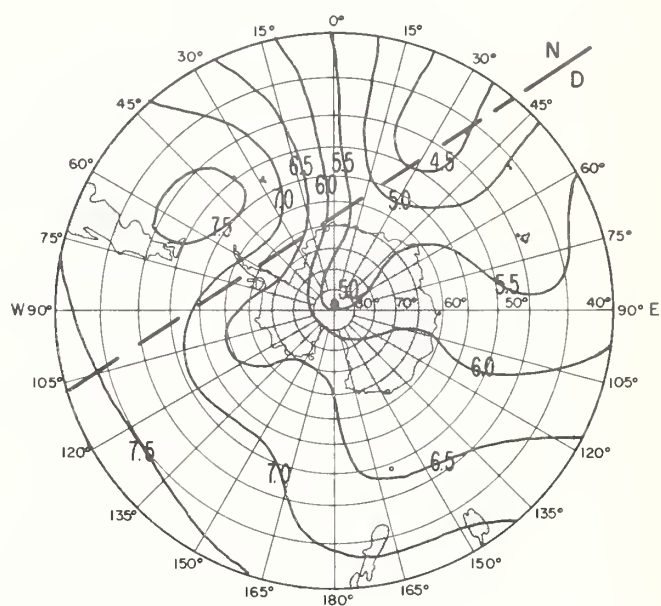
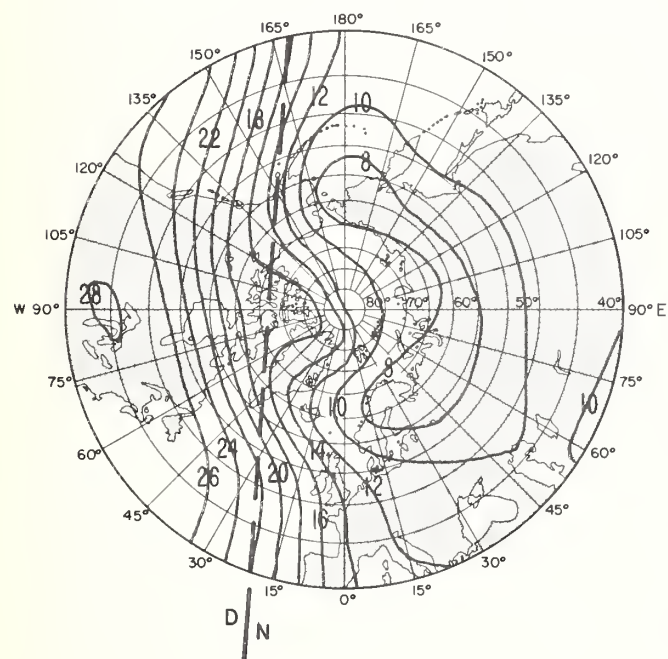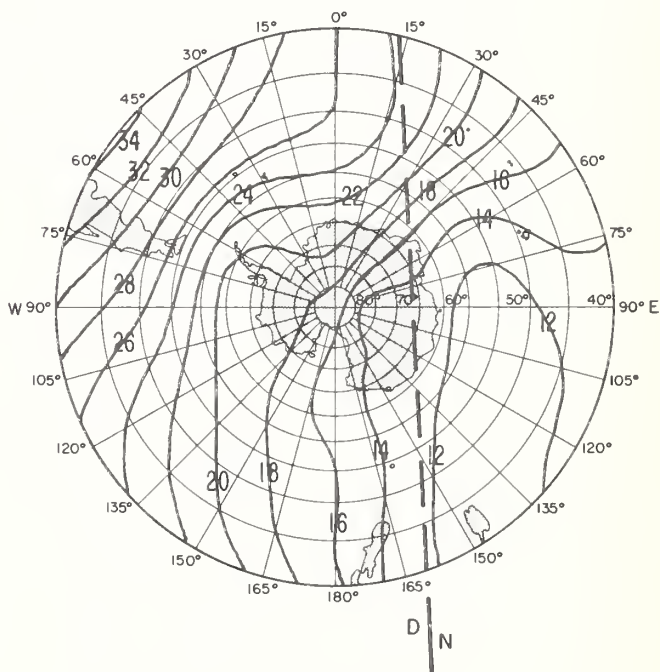FIG.14A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)
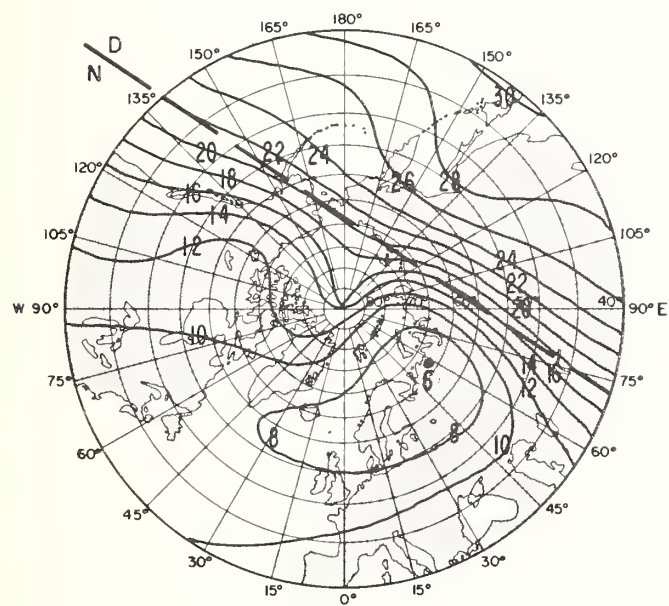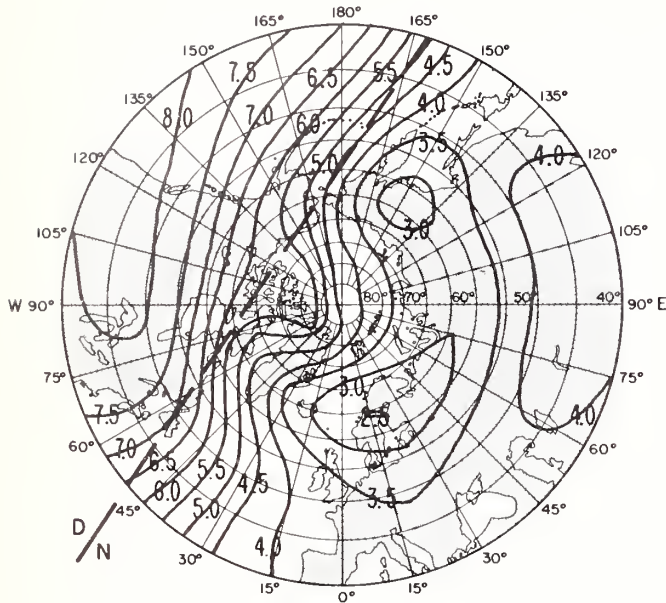
NORTH POLAR AREA

SOUTH POLAR AREA

FIG.14B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NOVEMBER 1965 UT=04

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 15 A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

NORTH POLAR AREA
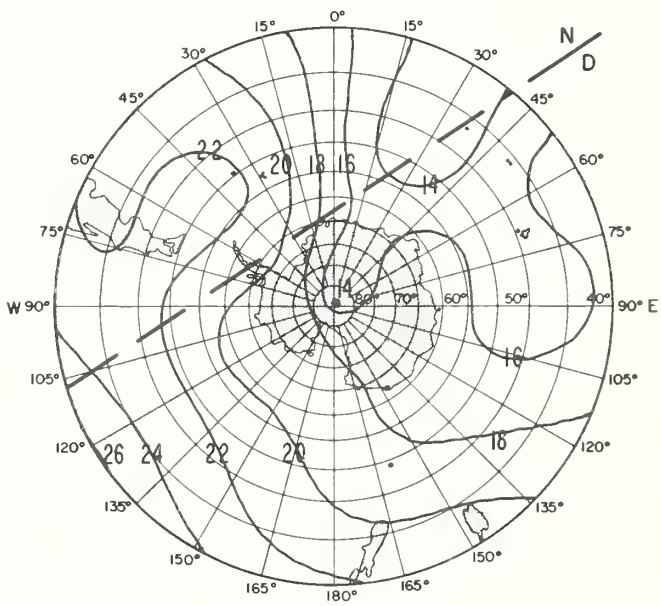
SOUTH POLAR AREA

FIG. 15 B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

NOVEMBER 1965   UT = 06

NORTH POLAR AREA
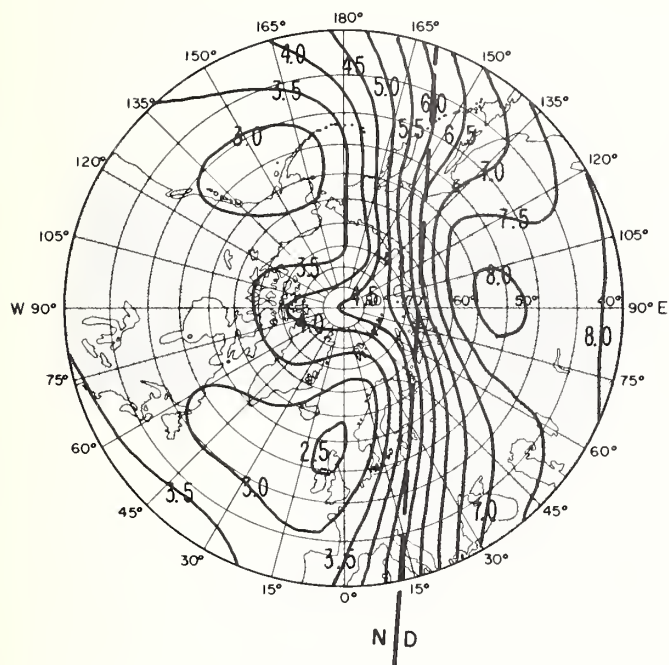
SOUTH POLAR AREA
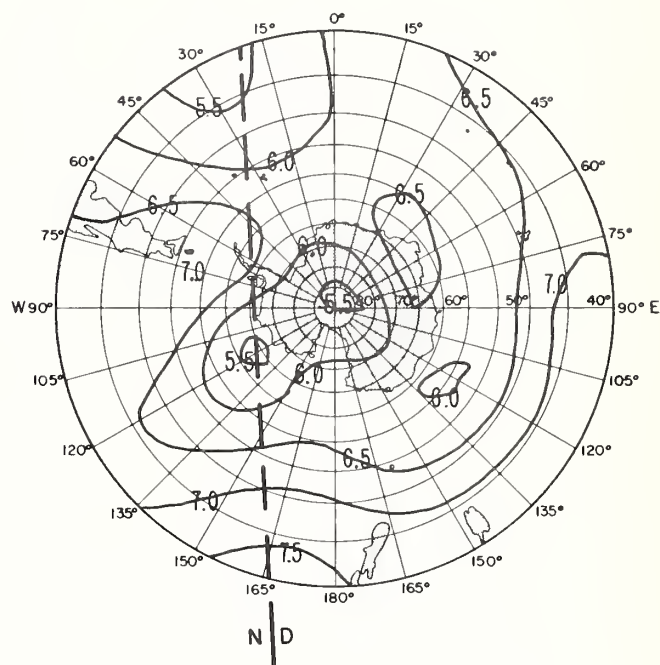
FIG. 16 A. PREDICTED MEDIAN MUF (ZERO) F2 (MC/S)
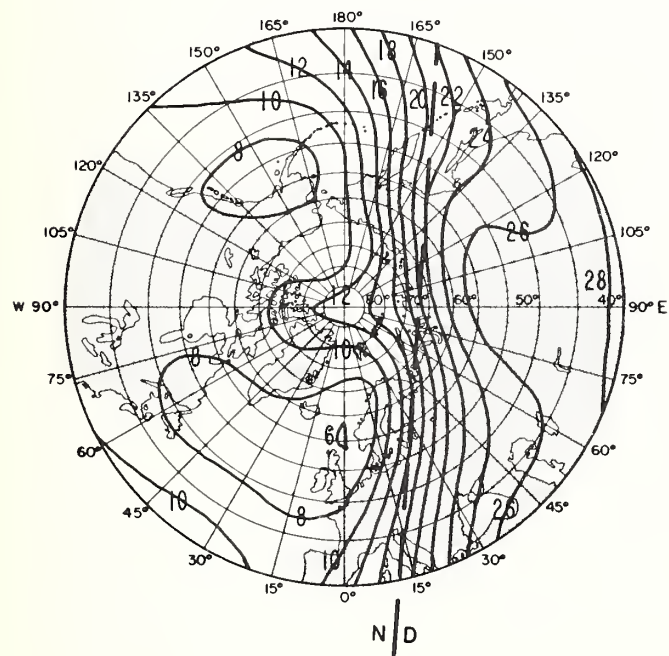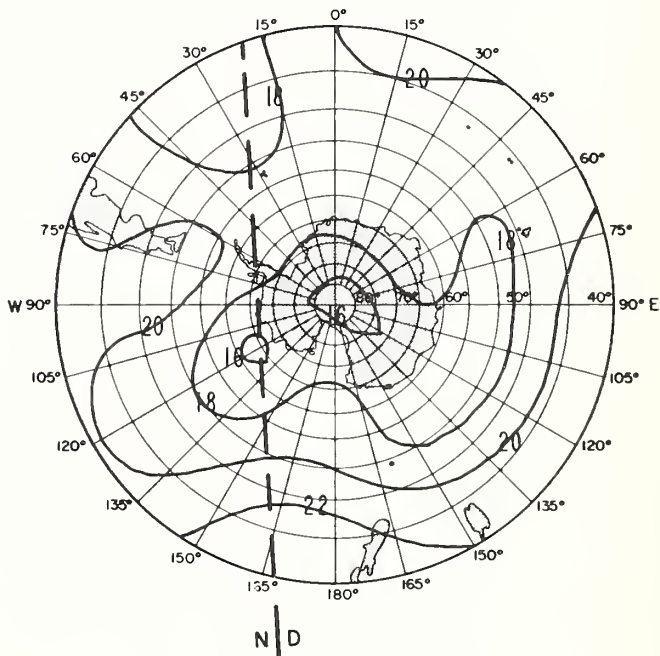
NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 16 B. PREDICTED MEDIAN MUF (4000) F2   (MC/S)
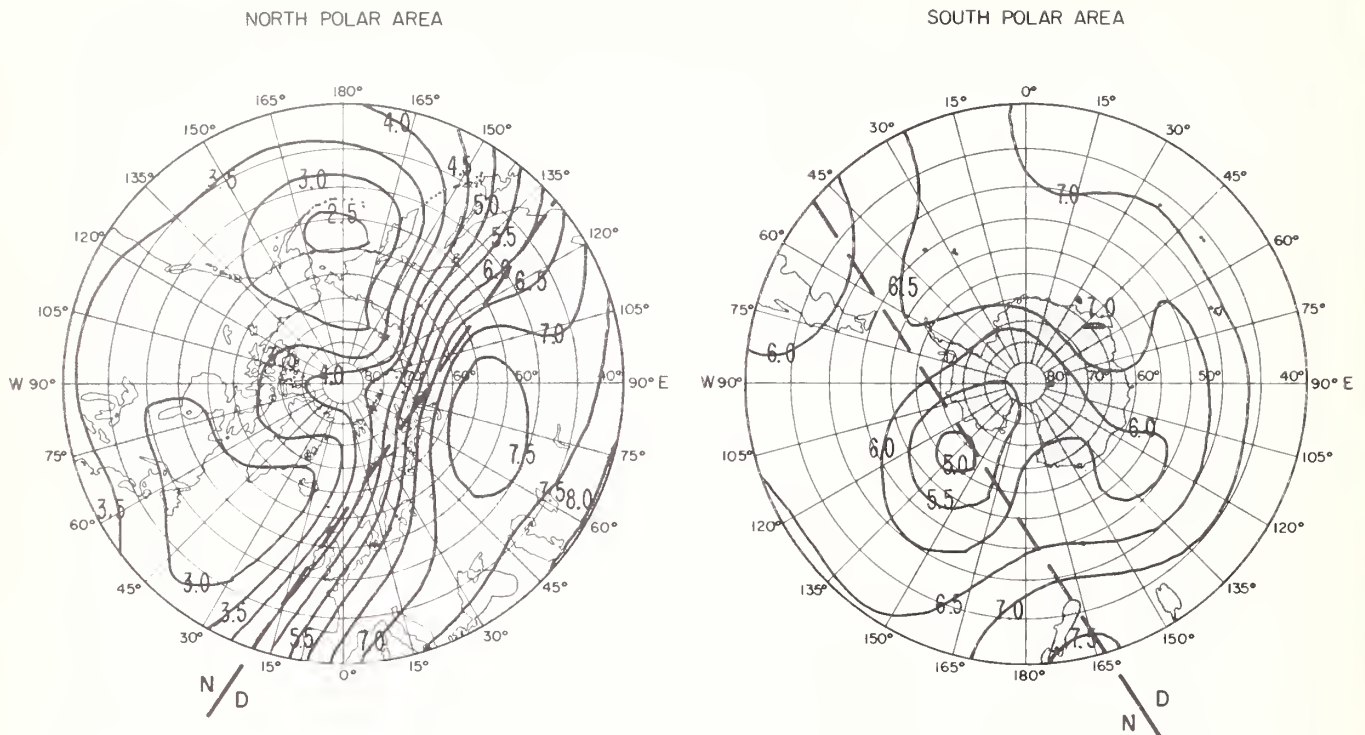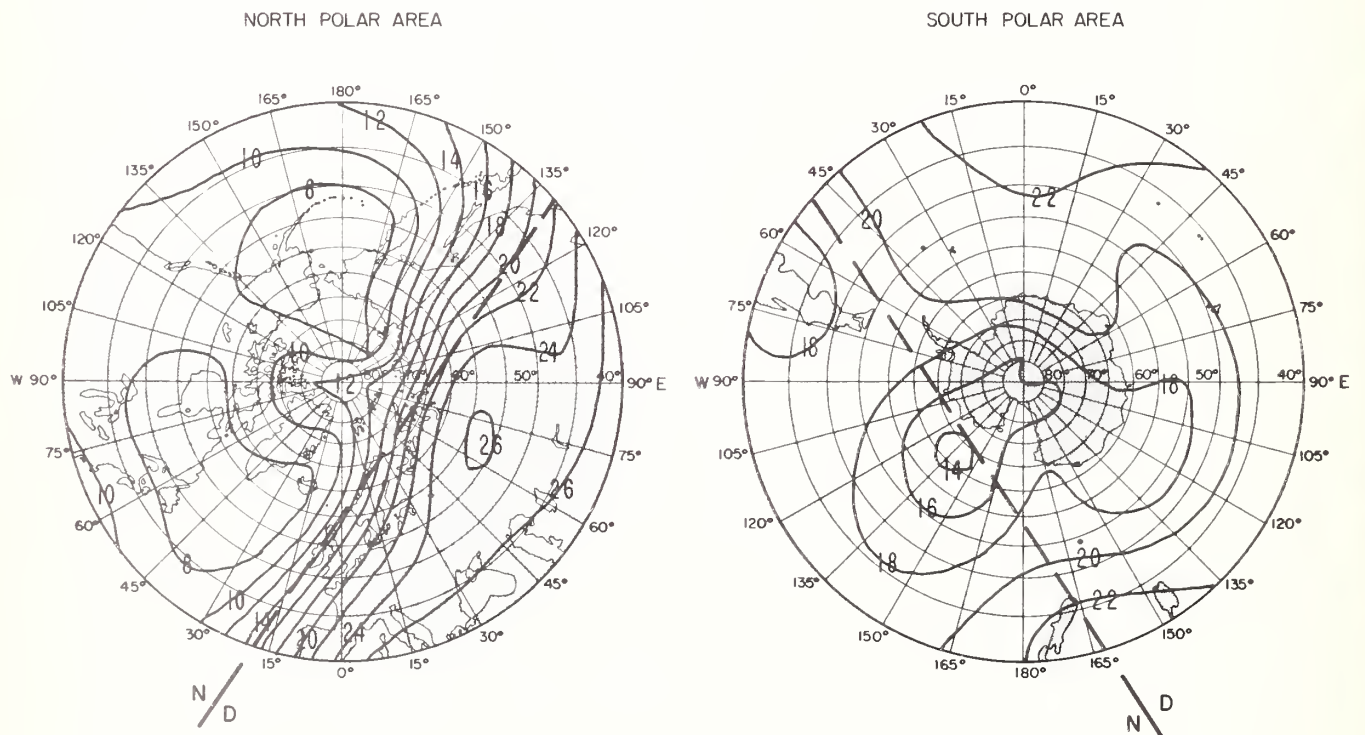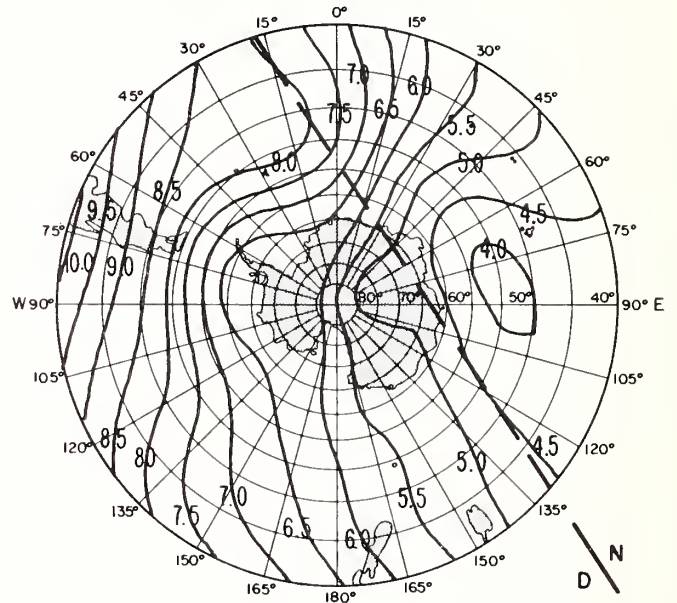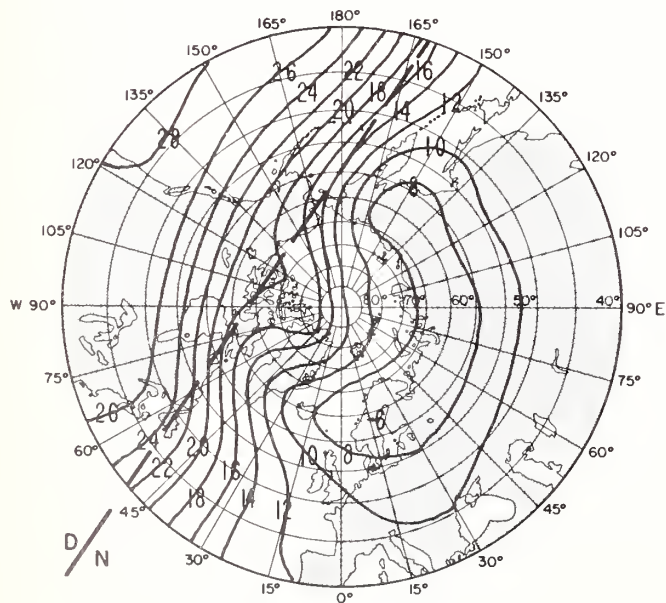
NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 17A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 17B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

NOVEMBER 1965 UT = 10

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 18A. PREDICTED MEDIAN MUF (ZERO) F2 (MC/S)

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 18 B. PREDICTED MEDIAN MUF (4000) F2 (MC/S)

NORTH POLAR AREA
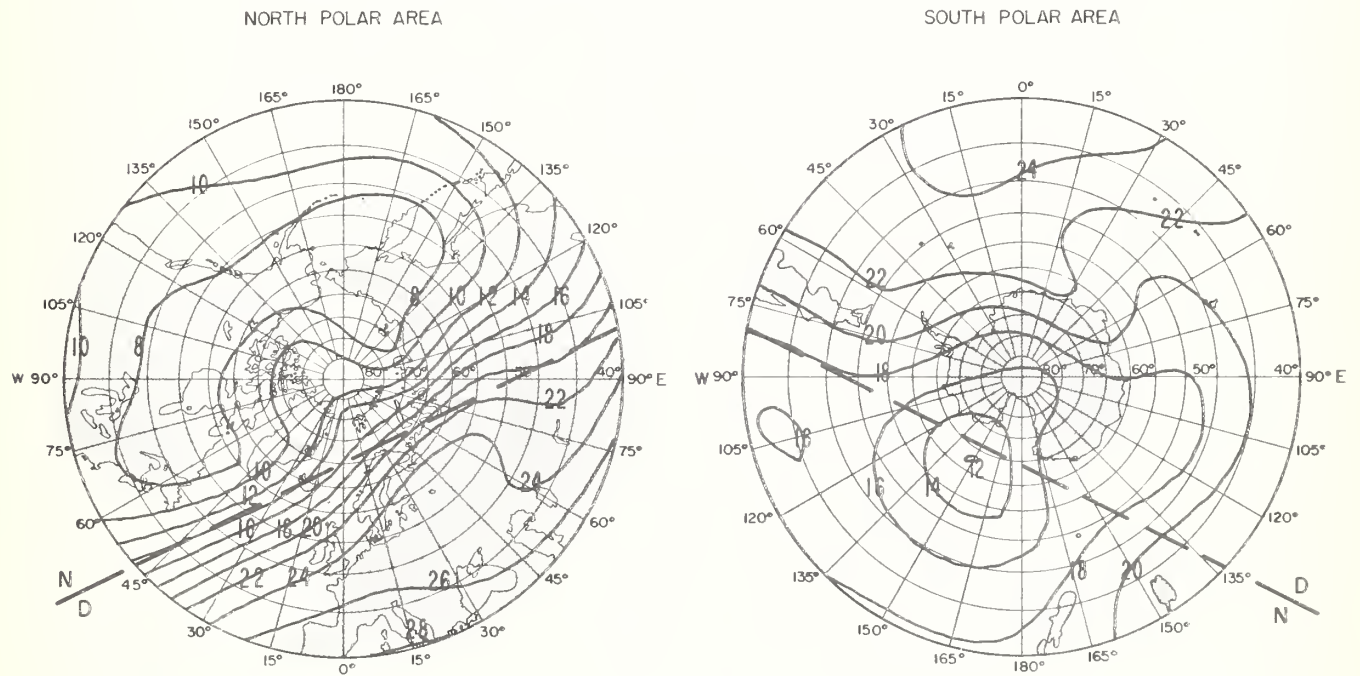
SOUTH POLAR AREA

FIG. 19A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 19B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 20A. PREDICTED MEDIAN MUF(ZERO)F2 (Mc/s)
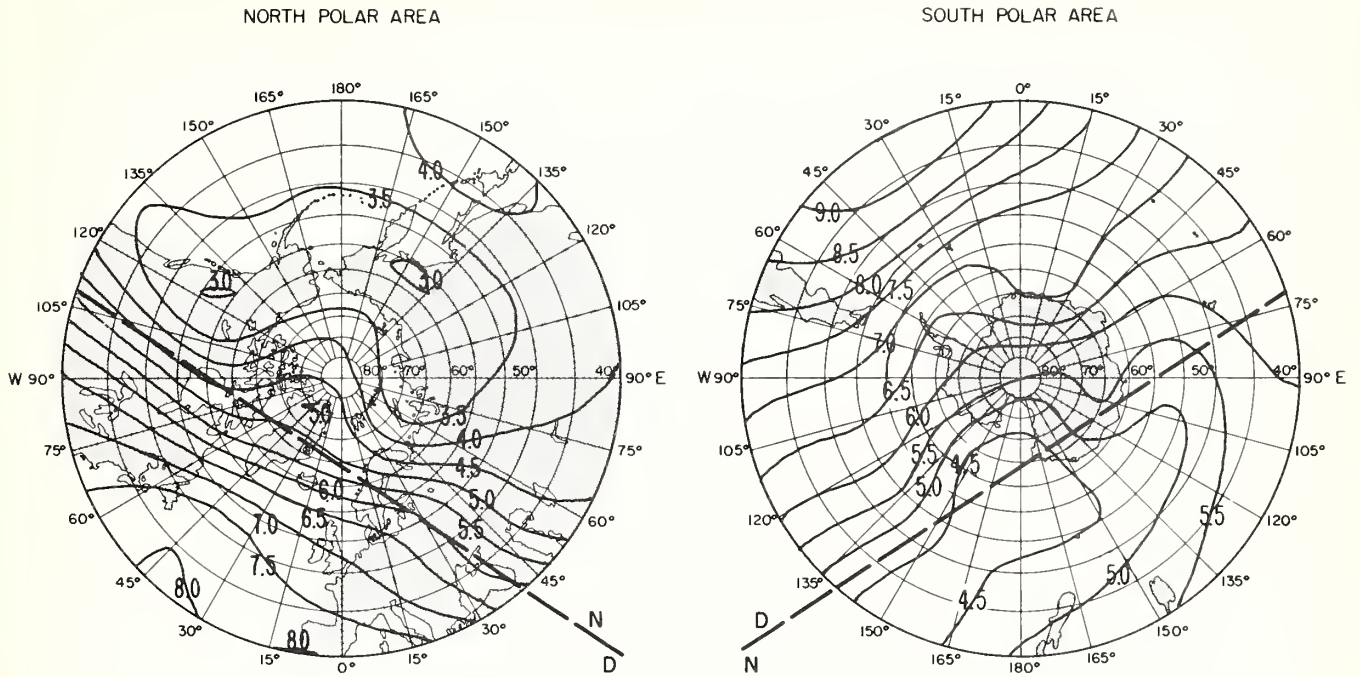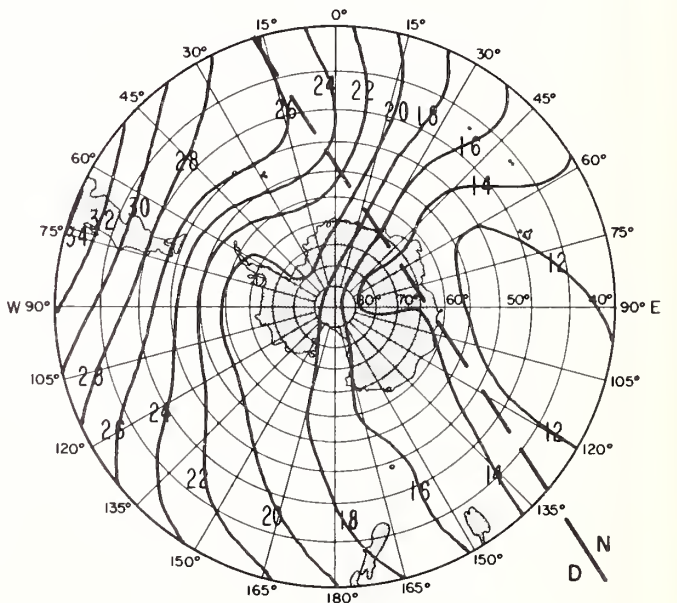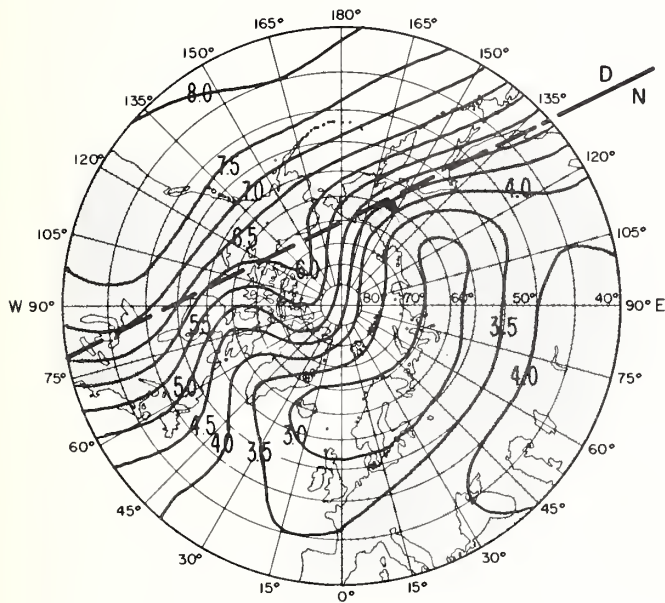
NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 20B. PREDICTED MEDIAN MUF(4000)F2 (Mc/s)

NORTH POLAR AREA
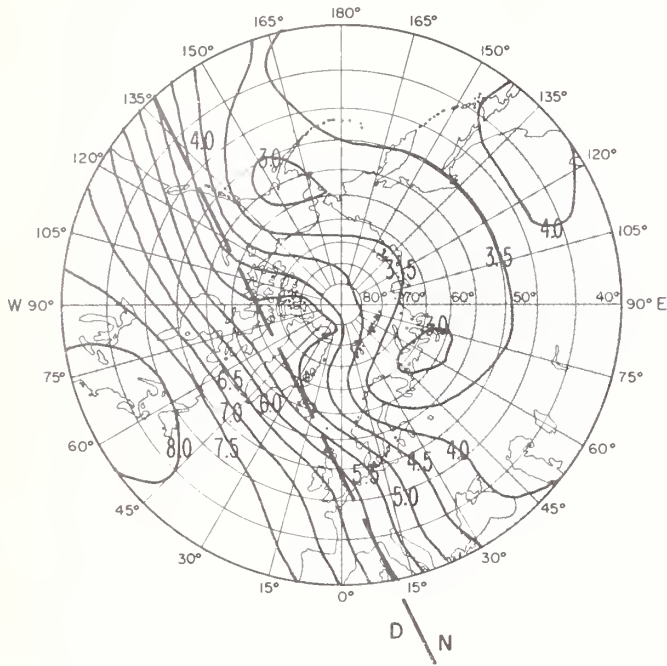
SOUTH POLAR AREA
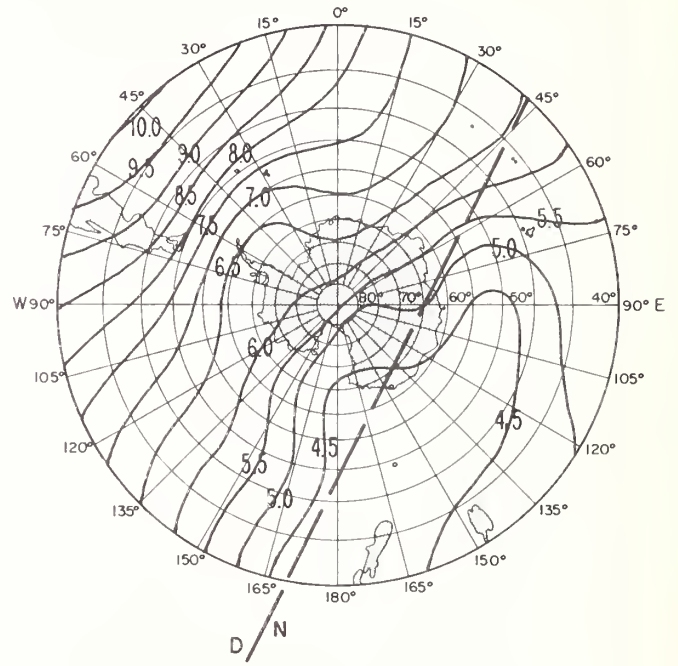
FIG. 21A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)
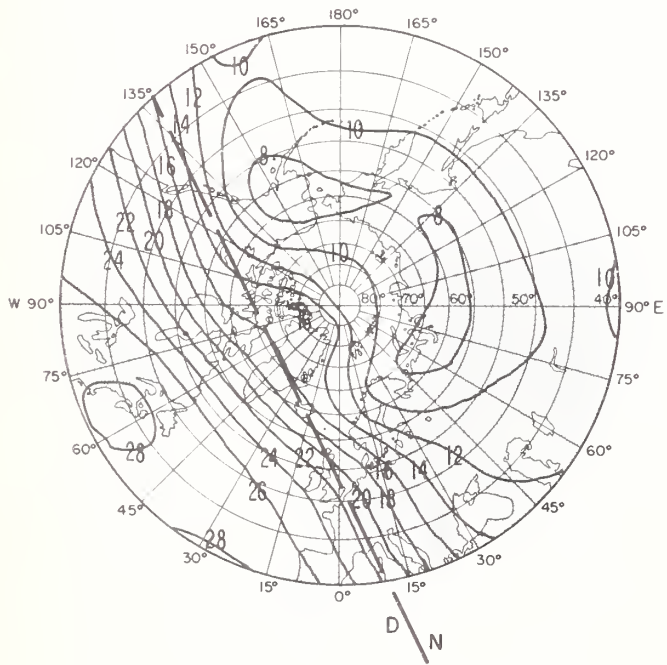
NORTH POLAR AREA
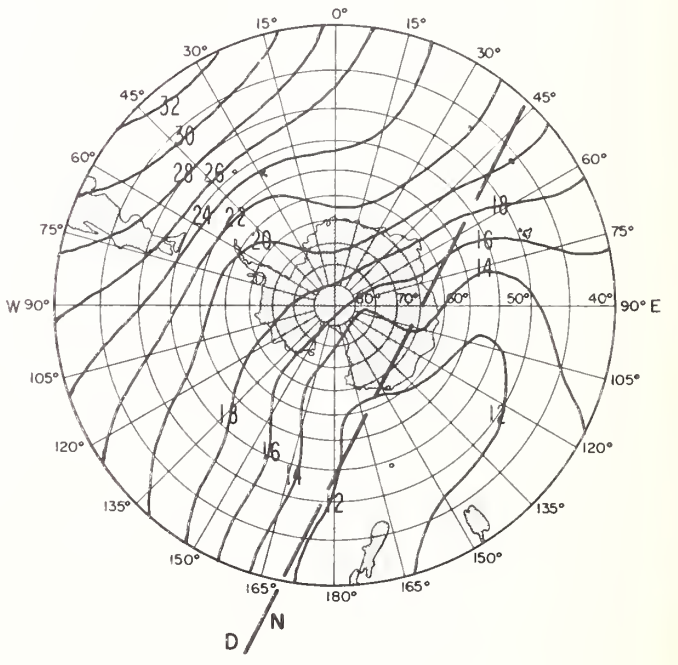
SOUTH POLAR AREA

FIG. 21B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)
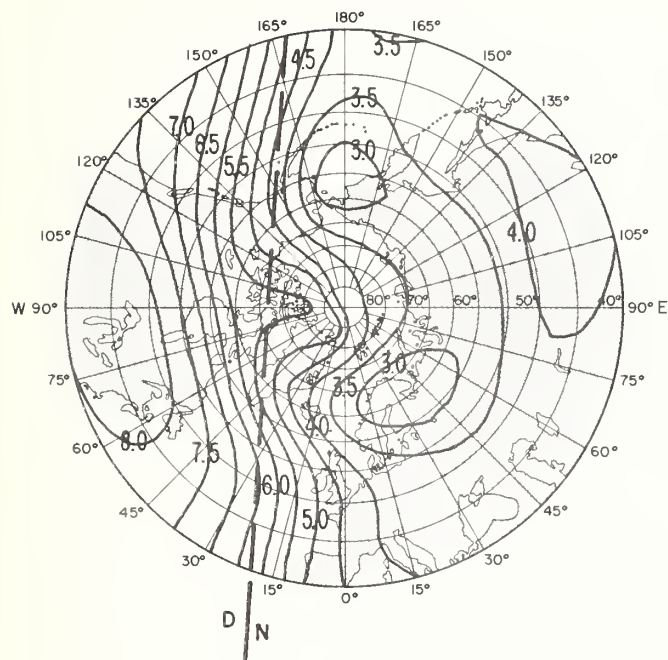
NORTH POLAR AREA
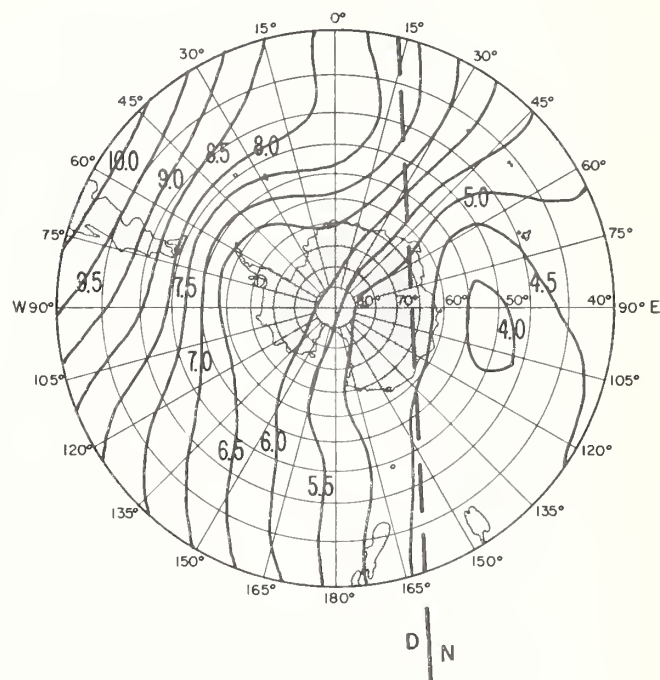
SOUTH POLAR AREA

FIG. 22A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 22B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

NOVEMBER 1965   UT=20
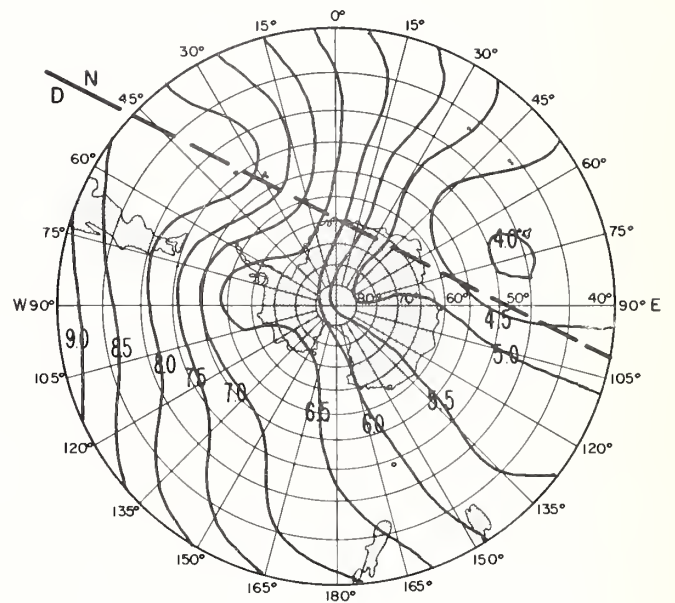
NORTH POLAR AREA

SOUTH POLAR AREA
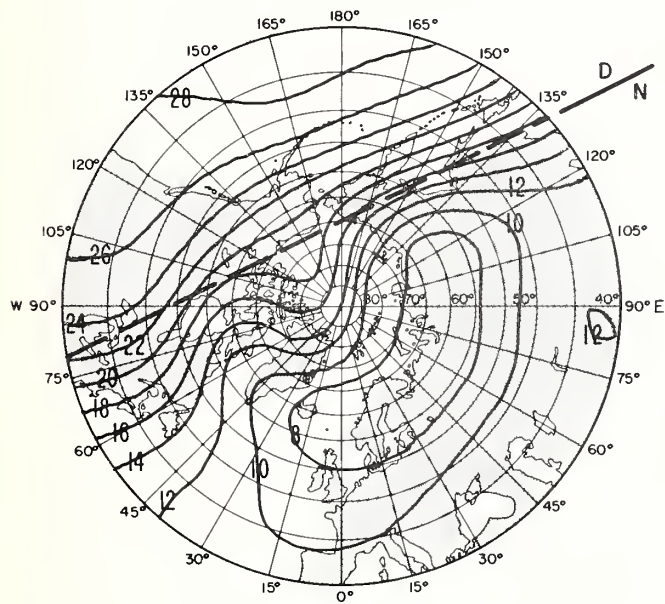

FIG. 23A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)
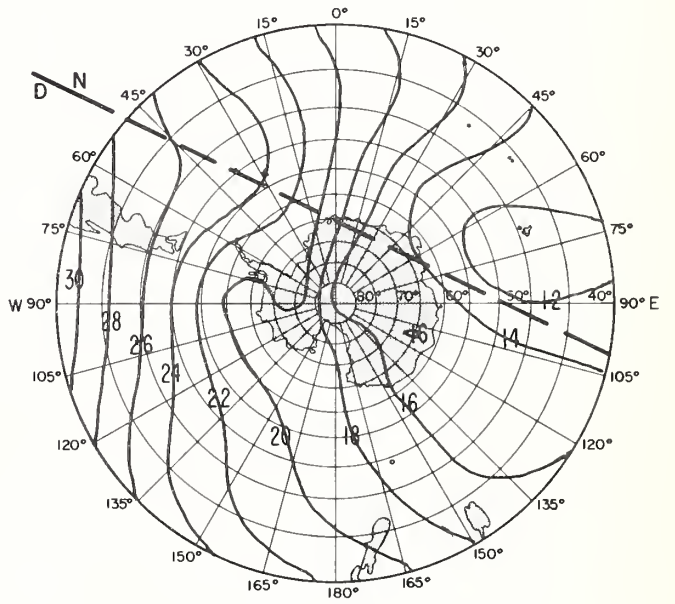
NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 23B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 24 A. PREDICTED MEDIAN MUF (ZERO) F2 (Mc/s)

NORTH POLAR AREA

SOUTH POLAR AREA

FIG. 24 B. PREDICTED MEDIAN MUF (4000) F2 (Mc/s)

DEPARTMENTS OF THE ARMY
AND THE AIR FORCE
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